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MONTHLY TRADE PUBLICATION

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A trade publication devoted to the interests of the manufacturers of major home appliances and allied metal products. Covers plant facilities and manufacturing problems from raw metal to finished product, with special emphasis on metal finishing.

Free controlled circulation to management, purchasing, engineering and key plant personnel in companies intimately connected with the field covered. To others, subscription price \$3.00 per year. Foreign subscription price (U.S. funds) \$5.00 per year.

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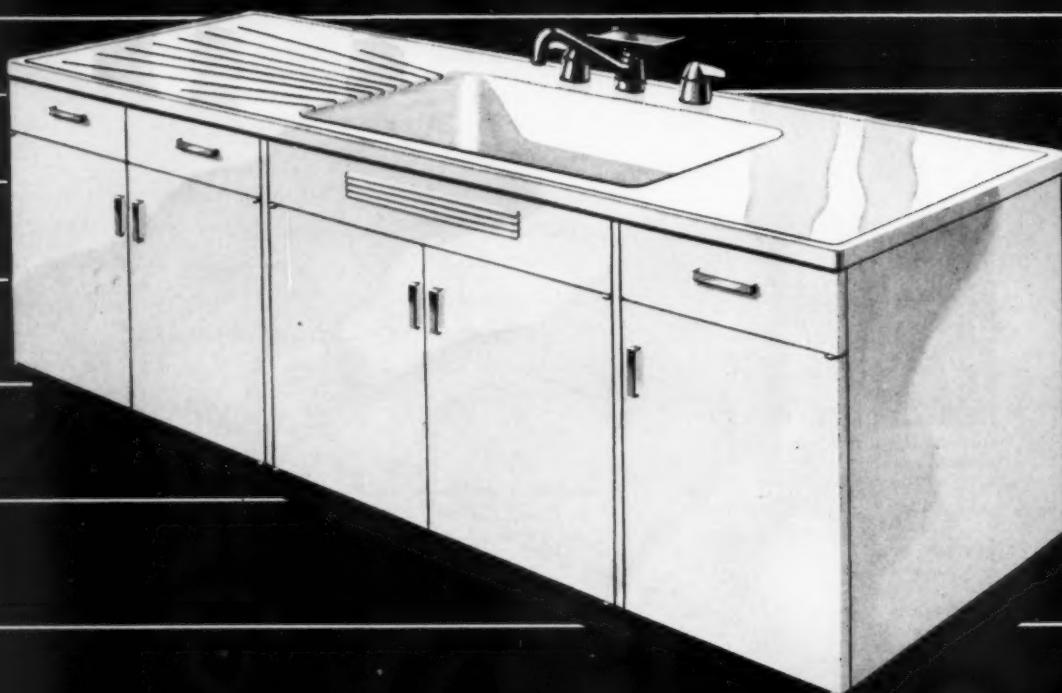
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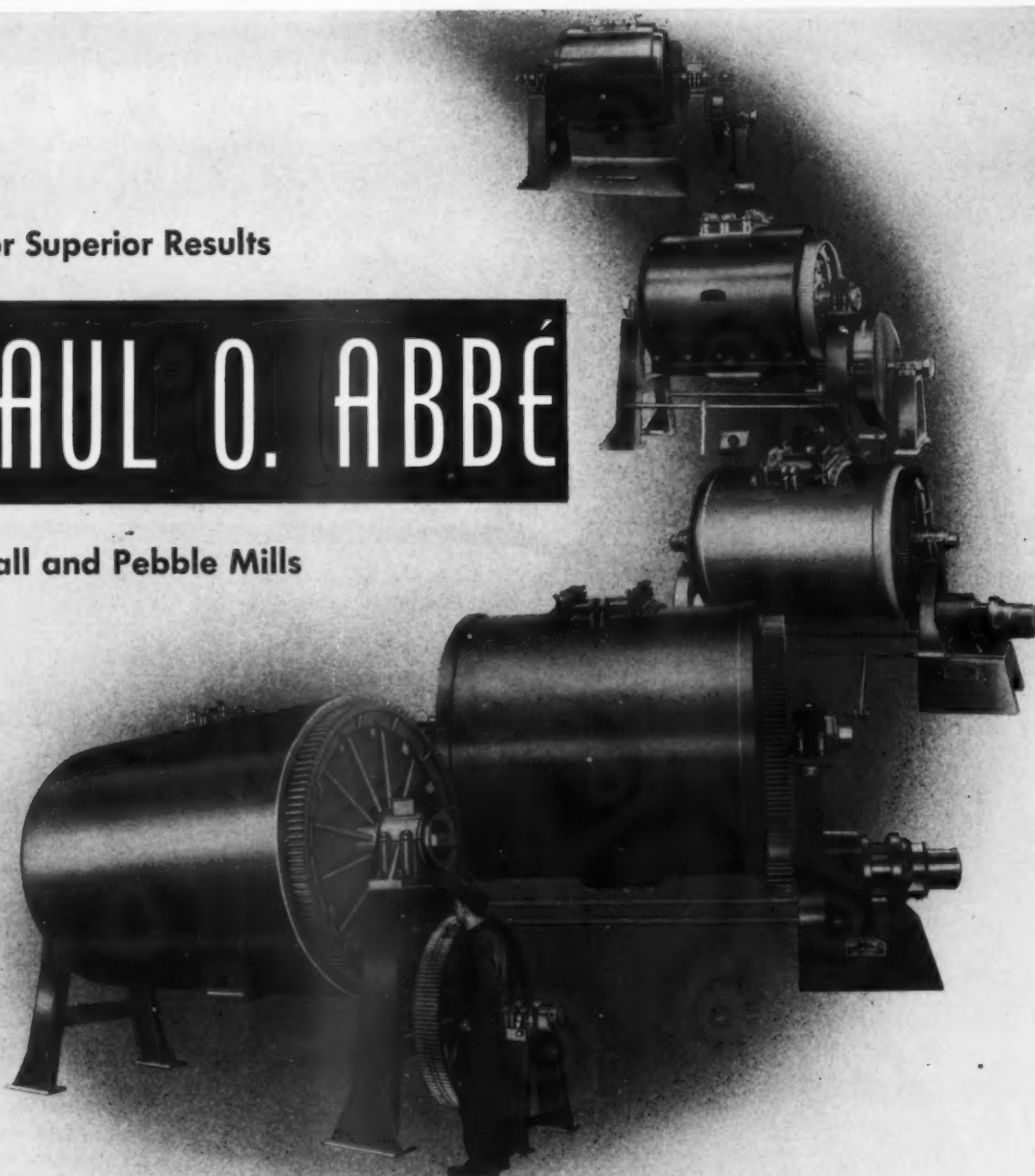
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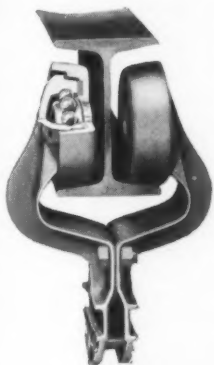
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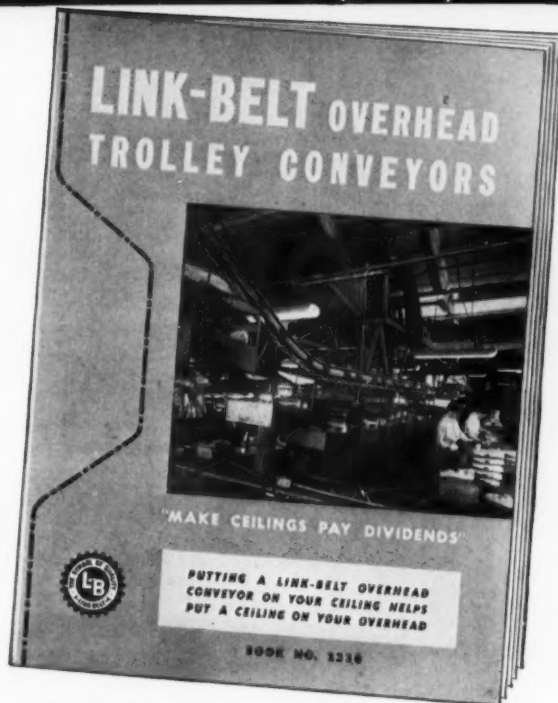
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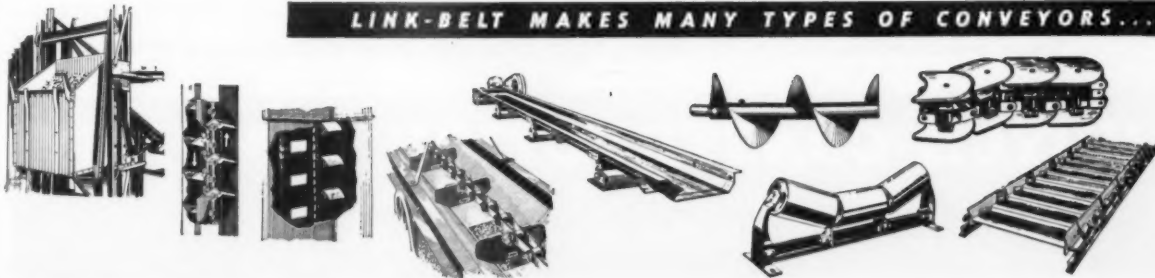
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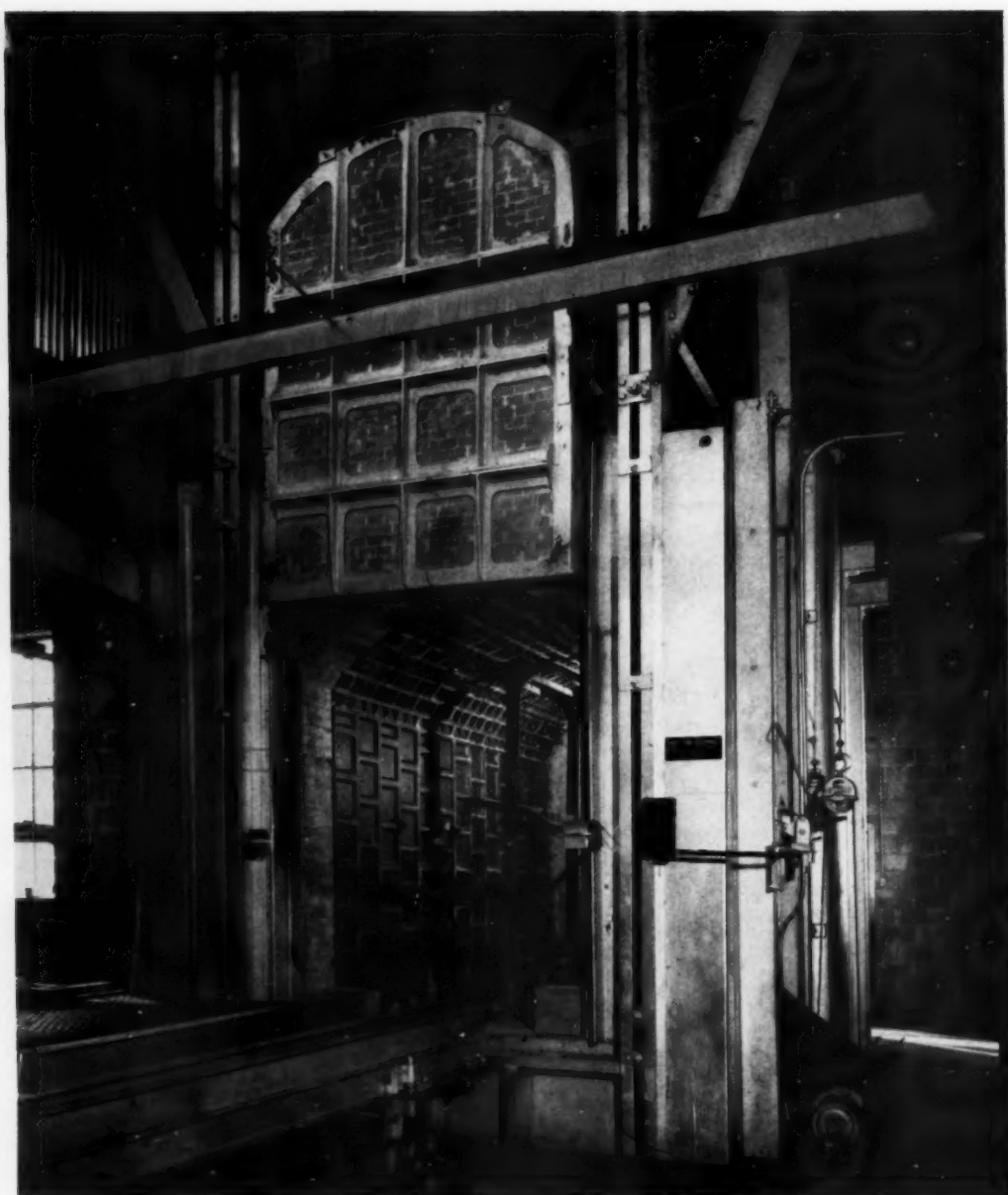
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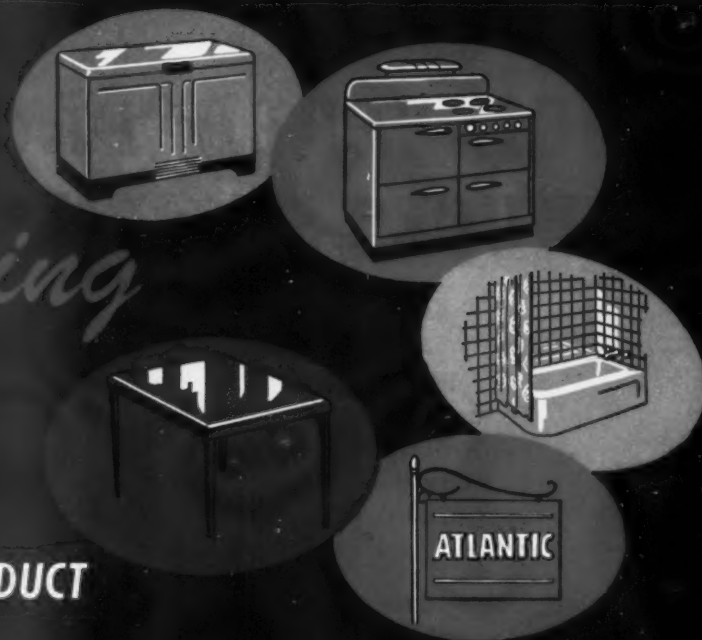
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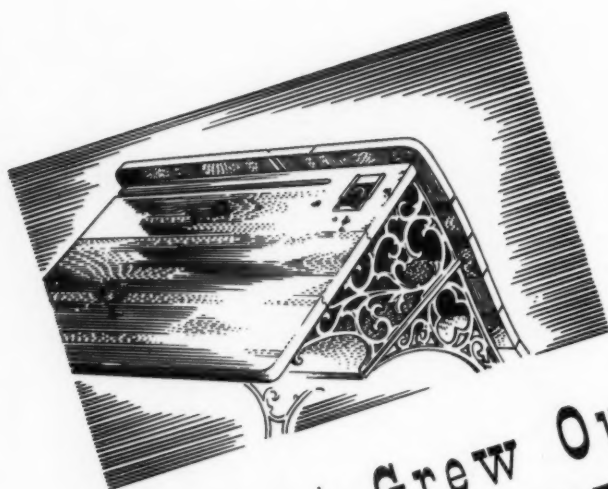
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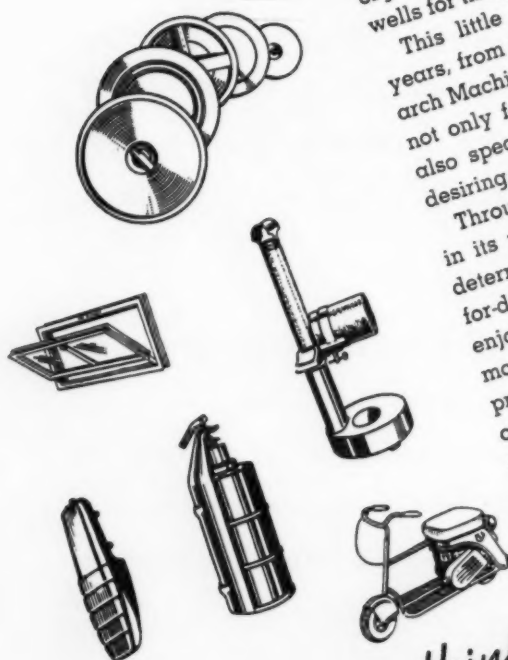


LOOK What Grew Out of an OLD INK WELL!

It was in 1911 that the U.S. Ink Well Company was organized for the purpose of manufacturing ink wells for the public schools.

This little company flourished and in a few years, from the old ink wells, grew the New Monarch Machine and Stamping Company, organized, not only for manufacturing its own products, but also special parts or completed products for all desiring such service.

Through constant up-to-the-minute improvements in its plant and manufacturing methods and the determination always to give the greatest dollar-for-dollar values, the New Monarch Company has enjoyed a remarkable growth. Now operating 3 modern and fully equipped plants geared to top production, the New Monarch Company today offers the alert and progressive manufacturer a complete service, including engineering, dies, jigs, tools, fixtures, stampings, finishing, assembly and packing—a Complete From-Blueprint-To-Shipping-Carton Service.



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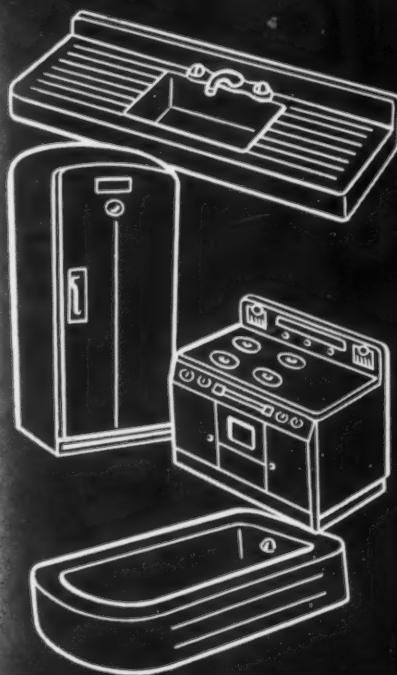
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- high degree of opacity
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- greater stability
- high strength
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- uniform high quality



Used either for regular and acid-resisting dry process cast iron enamels . . . or for antimony type sheet steel enamels, Metal & Thermit's Sodium Antimonate frit opacifier assures you of both beauty and durability in your finish. Manufacture is rigidly controlled for conformity of color in the frit and maximum opacity and lustre in the finished enameled ware.

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Call upon M & T — Headquarters for Opacifiers — for assistance. Our staff of ceramic experts and our Ceramic Service Laboratory are available to help you, whatever your problem. We welcome your inquiry.

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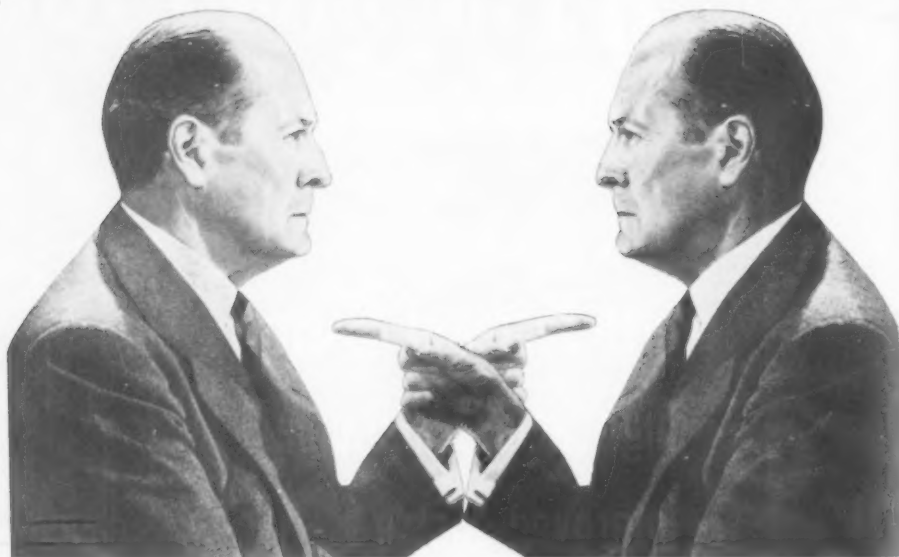
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Headquarters for Opacifiers

Tin Oxide
Antimony Oxide
Sodium Antimonate
Ultrox (Zirconium Opacifier)
Zircon

FIRST—WE HAVE TO CONVINCE OURSELVES



● Nobody can honestly and vigorously sell a product unless he has first proved to himself that it's right.

Here at Ing-Rich we employ excellent laboratory technicians and give them the finest, most modern equipment. When they develop a frit and tell us it is the best yet produced, we have every reason to believe them. *But we don't!* Before we offer the newest PORCELFRICT to the trade, we first use it—under the conditions prevailing in other plants—right in our own enameling department. If flaws show up there, back it goes . . . you never see it until we are sure.

That's "plant testing." It's the *extra* assurance that comes from convincing the toughest critics of all—ourselves. It's what makes you safe when you order PORCELFRICT.

FIVE OTHER GOOD REASONS FOR USING PORCELFRICT

- ① **IMPROVED SMELTING**—Ing-Rich uses unquestionably the world's finest smelting method, the result of exhaustive research and experiment.
- ② **LABORATORY CONTROL**—Our ceramic engineers maintain constant contact with the production staff to make sure of highest quality.
- ③ **FEWER REJECTS**—Now that we're back on a buyer's market, you have to watch your rejects. PORCELFRICT cuts them to a minimum.
- ④ **EXPERIENCE**—Since 1901 Ing-Rich has pioneered in porcelain enameling. We have learned a lot in that time—and our customers profit by it.
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OFFICES, LABORATORY AND PLANT • FRANKFORT, INDIANA

THE Finish Line

RAMBLINGS FROM THE EDITOR'S DESK—While scanning a few earlier pages of "The Finish Line" we found a few pet subjects which would seem to be in line for a little "touching up" at this time.

The table top industry

In early issues of *finish*, we raised the questions of design and construction as related to porcelain enamel table tops. It was pointed out that few design changes had been made from the standpoint of appearance and that the industry was missing a bet in not offering a "veneered" top.

As we all know, this is now ancient history and it remained for the producers of plastics and other competing materials to lead the way in appearance and top construction. They also led the way into a valuable business and left the porcelain enamel top by the way side. Now (*five years too late*) we will see porcelain enamel tops of similar design and construction.

How about counter tops?

The following is quoted from The Finish Line for April, 1947: "we've 'harped' on this subject before, and we will 'harp' on it again until some kitchen-conscious producer with porcelain enameling facilities offers the home owner the ultimate in kitchen work surfaces—a good heavy plywood counter top with a light gauge porcelain enameled work surface veneered to the plywood.

"In this suggested surface, the housewife could have everything that she desires. She could have a sound absorbent, colorful, *permanent* work surface that successfully resists heat, acids, scratching and wear. And—*very important*—she could enjoy these advantages without the effort of applying special liquids, waxes, polishes, etc., that are required to hold some semblance of the original appearance on less permanent surfaces. . . .

It's the simplest possible construction we are suggesting. Use light gauge, flat sheets—enamel with a semi-matte, acid resisting finish, in acceptable colors—veneer to plywood—finish edges with bright metal moulding, as in the case of materials used at present. Certainly, it's a "deluxe" job, but this type of surface, miles of it, is in daily use. Unfortunately, the surface finish in every instance is one of several competitive materials, not porcelain enamel. Let's do something about it now!"

Will it be another five years before someone makes a move in this direction?

The question of promotion and education

In June, 1945, under a heading "What about it?" The Finish Line carried the following: "Porcelain enamel needs, and always has needed, far stronger backing in educational and promotional activity. Without belittling the efforts of cooperative organizations, individual steel and frit producers, and the few manufacturers of finished products . . . we say that before porcelain enamel has a chance to compete in promotion with any of the materials (competitive materials) mentioned, scores of others must add the weight of their time and money to this effort."

Porcelain enamel is still one of the "most used—least understood" products in use today. It will remain so until far more "push" is put into educational material, advertising and promotion.

A free ride on Safe Transit

The speed with which the National Safe Transit Program for the reduction of packaging and shipping losses in the major appliance and allied metal products field is gaining headway on a national basis speaks well for the ability of industry to work together on a strictly voluntary cooperative basis. Individual manufacturers should appreciate the fact that this complete pre-testing program was developed by hard working individuals on their own and their respective companies time and then handed as a "package" to any manufacturer in the field who cares to accept it for his own use. The most that any individual manufacturer can spend is a few dollars for testing equipment or laboratory services and he stands to gain *many* dollars in improved practices and shipping loss savings.

In contrast to this we see a suggestion in another publication that a fund of \$6,500,000 be raised to attack the same problem, presumably most of it to be spent on railroad improvements.

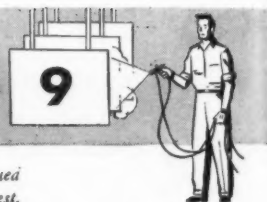
That's why we say the appliance industry is getting a "free ride" and any manufacturer who fails to take advantage of the opportunity is short-sighted indeed.

Dana Chase

EDITOR AND PUBLISHER



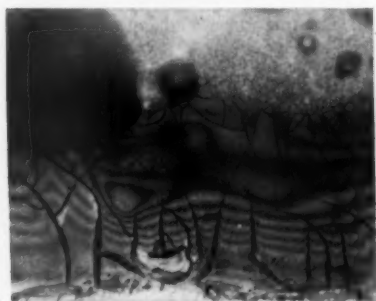
Enameler's Data Sheet No. 9



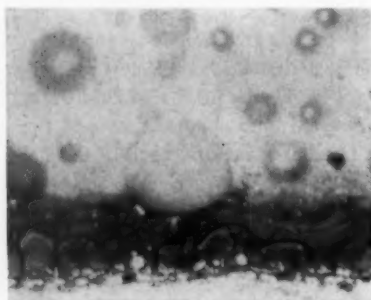
An informative series on titanium-bearing killed steel for the enameling industry. Issued monthly by Inland Steel Company. Reprints of all data sheets are available upon request.

TITANIUM ENAMELING SHEET STEEL SHOWS EXCELLENT ENAMEL ADHERENCE PROPERTIES

Through the four years that titanium-bearing killed steel has been porcelain enameled by manufacturers, it has shown excellent adherence properties—particularly when the adherence is judged by the performance of enameled parts in assembly, transit, and final serv-



Ground coat on enameling iron. Iron oxide-rich layer approximately .002 inch thick.



Acid-resistant enamel on titanium steel. Iron oxide-rich layer approximately .001 inch thick.

ice. In all instances, titanium steel has practically eliminated enamel chipping.

Titanium steel is non-reboiling, and can be enameled with a single thin white cover coat as light as 20 grams

per square foot—.004 inches in thickness. Experience has proved that these thin enamel coatings have remarkable adherence, and intensely resist chipping—whether from impact, torsion, or thermal shock.

Evaluating Adherence

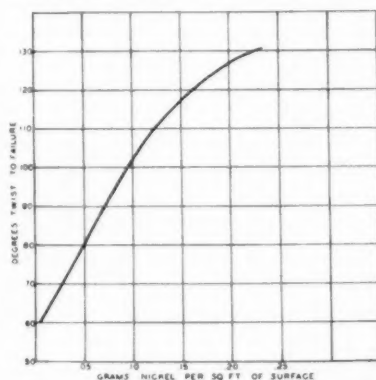
The ordinary method of evaluating adherence of a porcelain enameled metal is by the falling-weight-plunger-die test. A test of this kind actually measures only resistance to impact. Using the standard die, tests of single-coat-enameled titanium steel would seem to indicate low adherence. If, however, the diameter of the female die is increased, the impact then results in little or no break; and the evaluation of the adherence rises considerably.

Torsion tests give an excellent measure of resistance to chipping by flexure. In these tests, a metal angle enameled with ground coat and white with a total thickness of .015 inches, can be twisted only 45° before failures occur. A titanium steel sample with an enamel thickness of .005 inches can be twisted 110° before the enamel fails.

This method of testing is also used to determine the optimum amount of nickel flashing necessary for good adherence. The chart on this page shows test results using titanium oxide enamels.

Nickel, applied by simple immersion without the use of electric current, pro-

motes enamel adherence by controlling the oxidation of the metal during the firing operation. For satisfactory results, a certain minimum weight of deposit



Relationship between weight of nickel flashing and adherence of porcelain enamel.

must be maintained. This has been found to be about .07 grams of nickel per square foot of surface.

As can be seen in the accompanying micro-photographs, the resulting bonding layer is thinner than that obtained with cobalt ground coats.

Future Enameler's Data Sheets will further discuss the properties of Inland TI-NAMEL titanium enameling steel. Write, if you would like additional information on this superior base metal.

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TITANIUM-BEARING KILLED STEEL ENAMELING SHEETS

How to give costs and competition

a trimming

a large stamping company talks to its employees through the medium of photography and plant personalities

MY JOB Is Important" — truth or baloney? Someone is always writing that every job in a modern factory is important. Your company tells you that. Are they kidding? After all, some people in the plant don't even know what happens to the parts they make.

But it's true! Every job must contribute to the good of the company and its employees, or the job wouldn't last very long.

"Okay," you say, "so I'm an important person — on the charts — so what?"

Just this: The "easy money" days are over. Customers are harder to satisfy. Manufactured products have got to be better and, if possible, cheaper. The big job right now is to keep production costs down. If we don't, other factories will take our customers away from us.

It doesn't take a genius to figure that one out, does it?

"Have you heard . . . "Rumor-mongering causes dissatisfaction, affects work. Get facts before you talk. Actors are Clarence McCartney and Gordon Melow.

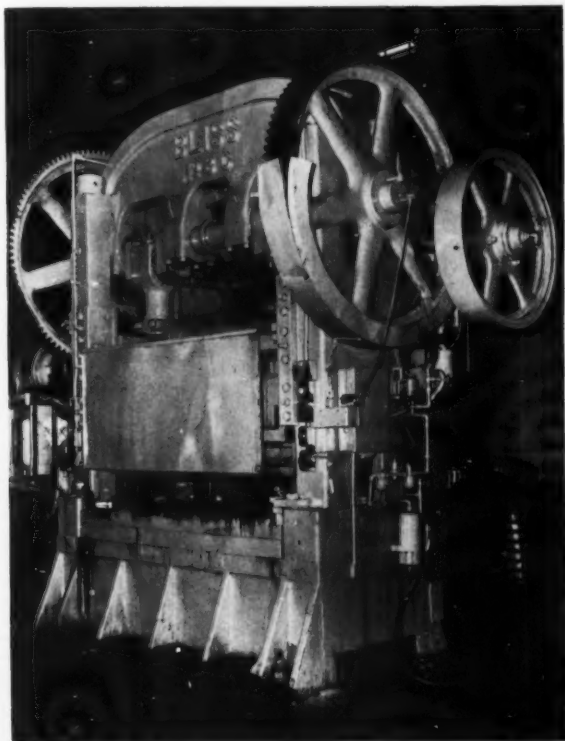


Here's an opportunity for every man on the job to contribute personally, by saving time, motion and material.

And it doesn't matter whether you're just the guy who seals the freight car door shut after the Joes on the production line have finished building the merchandise. You can still seal the door better and cheaper, putting the company in an easier position to bid the pants off competition when the scramble for orders begins.

Here's a good example: Recently a plant made a slight change in the method of setting dies that saves $2\frac{1}{2}\text{¢}$ on each piece that was made. Doesn't sound like much? Multiply that by 100,000 pieces and you'll see why the plant manager was pleased to put it in his weekly report.

On the following pages is a picture story showing just a few of the thousands of ways production costs can be cut.



This press made no parts today. The operator was absent. Absence from the job raises costs and reduces work in other departments because of parts shortage.



Pull that curtain! Consideration for others can be a cost saver, too. Injury or discomfort can result from blinding glare of unprotected welding torch, as shown above by Homer Boals and Charles Hinchcliffe.

Small parts loss can mount up. Extra care in handling small items can save money and jobs. Emily Sell and Ann Forrest pose for picture showing disorderly parts handling.



Even careless disposal of waste raises costs. Chauncey Wyenski's time is taken up unearthing stock from a litter of paper and garbage before stock can be used.





If everybody did their job right, repair expense could be lowered. Excess paint on this cabinet upped costs, causing unnecessary work for the sander, Albert Cook.



Employees who work safely are cost cutters. When an accident happens, no matter whether it is the smallest cut, have it treated immediately. Nurse is Kathryn Kaiser.

Every finished product that inspectors reject because of defects adds to the cost of production, and gives competition a break. Inspectors are Bruno Panezotti, Henry Baird and James Pastore.

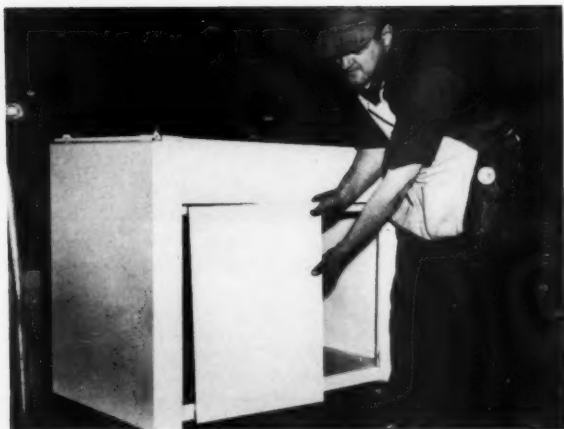




If you don't understand what's going on, there are various methods of getting information. Shown here are three easy ways. Carl Buresti asks a question of foreman Howard Muslof, Bill Fisher reads the company publication, and Wilmer Rufener reads a plant bulletin board.



Salvaged from the floor, small cabinet parts are sorted by Steve Mack. Proper handling of parts would eliminate operation, saving time and expense.



Somebody didn't do their jobs well and Joe Groth had to put a new door on this cabinet. By reducing damage, substantial savings can be made.

Damage to finished products or cartons is sometimes caused by carelessness. Then it costs money to have the merchandise re-finished or scrapped. Al Liberator and Harvey Lott are the actors.

Editor's Note:

Finish is indebted to the Mullins Press, company publication of Mullins Manufacturing Corp., Salem and Warren, Ohio, for the photos and information from which this illustrated story is adapted.



Packing for export— a lesson in appliance protection

a practical example of how product design, package protection
and proper testing methods can effect safe delivery

By Paul H. Paulsen • SENIOR ENGINEER, ENGINEERING DEPARTMENT, WM. H. McGEE & CO.,
INC., NEW YORK CITY



The Ocean Marine Underwriter is confronted with the problem of damage to appliances much of which shows up as damage to articles when subjected to wracking, or shock by dropping.

The chief offender has been the gas or electric range, where the breakage most frequently occurs at the corners of the panels, oven doors and drawers. Just one small damaged spot has often resulted in a request by the consignee for an allowance of 50% for depreciation, and as long as breakage can not be satisfactorily repaired, such claims will continue.

Underwriters do not question claims where the documents show that the packing case was damaged due to rough or careless handling, or by being dropped. However, when the case arrives in perfect condition, but with the range damaged, they begin to ask questions.

Designed for the kitchen

In some instances we have found that the range was not properly designed to withstand the perils of ordinary transportation. The designer had apparently only worked on the premise that the range would always stand perfectly level on its own base on the kitchen floor. Perhaps he also believed that the outside markings, such as "This Side Up" would always be observed. In such cases, the problem was solved by changing the interior design of the range so as to take care of the stresses set up in the metal when the range was stowed on the side or upside down. In most instances we found that the internal packing was inadequate.

Through experiments and tests over a number of years, the theory of the "Floating Pack" was developed, and this method is now used by most exporters of gas and electric ranges.

It was developed primarily through cooperation between the exporters and the underwriters.

A practical example of shipper research

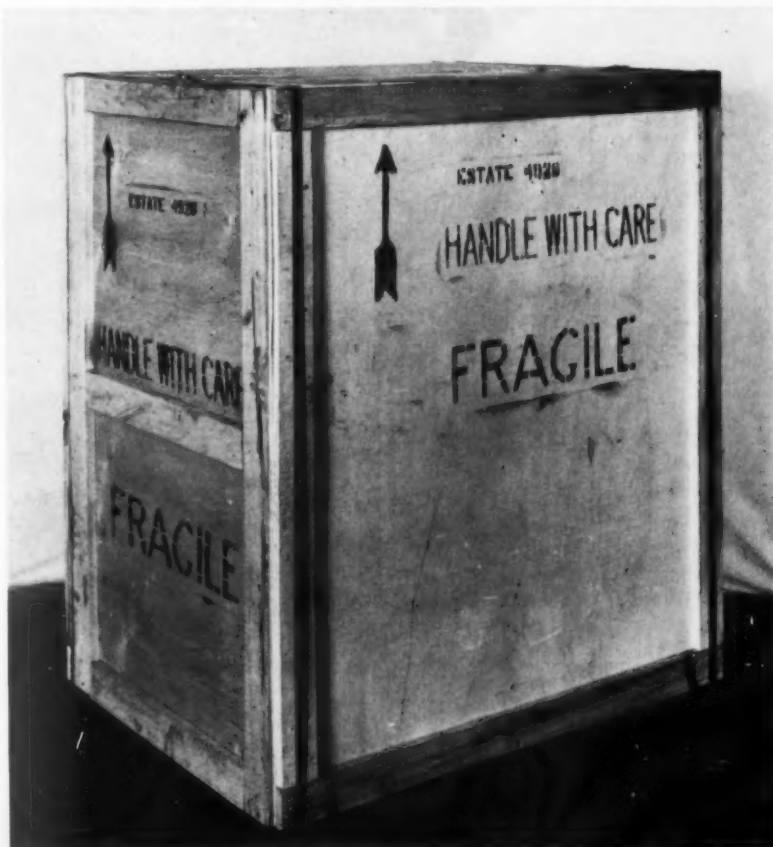
A perfect example of such cooperation is our experience with Noma International, Inc., the export divi-

sion of Noma Electric Corporation.

When this concern took over the Estate Heatrola Company, at Hamilton, Ohio, our packing engineer conducted drop tests at the factory of the packing then in use and here is what he reported:

"After completing the drop tests, the case was opened and contents examined with the following results:
(A) Fracture of porcelain was noted at edge of valve opening, second from right hand end of manifold panel. →

Exterior of the packing box with steel straps applied vertically around the ends of the box. The markings shown are in red stencil.





(B) Fracture of porcelain was also noted at lower front and lower rear corners and also near top rear corner, right hand body side.

(C) Porcelain fracture at lower front corner of front edge and also top rear corner of left hand body side.

(D) Left body side also bent to cause enamel breakage front to back, approximately at location of broiler bottom. Same condition vertically, approximately 2 inches from extreme rear, which is location of main back flange.

(E) Lower front corners of oven showed fractured finish, adjacent to door openings.

(F) Entire range framing slightly distorted causing door panels to be out of alignment.

The severe damage as described can only be attributed to improper anchorage as well as insufficient cushioning of the unit within the packing case, with the result that exterior

pressures against the case were transmitted directly to the range. This condition was partially due to the failure of excelsior pads to properly support the upper frame work of the

Left: The range leg-base is bolted to the "sub-bottom", which in turn is resting on the main bottom of the packing box. Rubber pads are used between the sub-bottom and the corners of range base.

unit. The base of the range being held firm and without sufficient upper structure support, caused the range to "whip", thus straining the finished surfaces, resulting in breakage of the panels at curvatures and points where panels are bolted or otherwise attached to the range framing."

Improving the pack

Another range was then packed, using the "Floating Pack" method, and subjected to the same series of drop tests, with the following results:

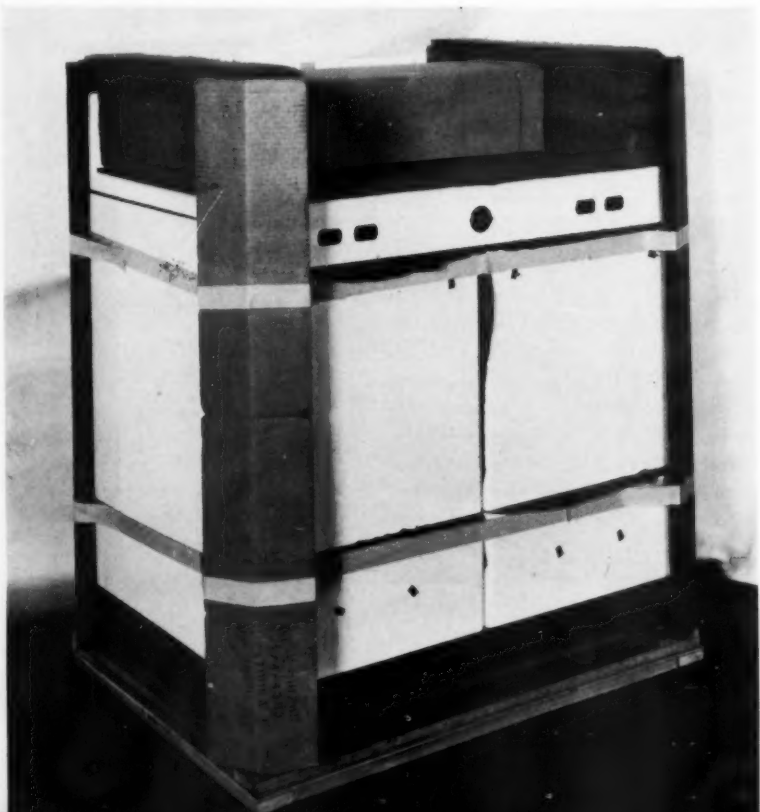
"(A) Right hand body side panel—porcelain slightly fractured at bottom rear corner and also at rear corner, approximately 4 inches above bottom and at rear corner at location of holder nib.

(B) Left hand body side—porcelain slightly fractured at top rear corner and also at location of holder nib.

The breakage was confined to small

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Right: Showing the positions of the built-up pads of corrugated paper at the four corners of the range body and above the range top for export shipment.



Grit blasting sheet steel parts

a comparison between sand and grit blasting based on both laboratory and production work

By *A. E. Raeuber* •

MANAGEMENT ENGINEER, CERAMIC RESEARCH AND DEVELOPMENT, MILWAUKEE, AND

E. D. Ploetz •

MATERIAL AND PROCESS CONTROL SUPERVISOR, KANKAKEE WORKS, A. O. SMITH CORP.

THROUGH the combined efforts of many individuals, grit blasting sheet steel parts for porcelain enameling has been proved to be a satisfactory method. At A. O. Smith Corporation, much of the cleaning has been done with sand blasting. A true comparison between sand and grit blast prior to coating sheet steel parts with special purpose ground coats has been made.

Advantages of grit blasting

There is no major worker health problem, such as silicosis. Reasonable care for operating in dust atmospheres is of course required.

The quality of cleaning is excellent. Even the exacting requirements for cleaning for porcelain enameling are met as well as they are by sand blast.

The cost of cleaning is highly competitive. The costs are well below those of sand blasting and close to estimated figures on pickling.

Maintenance of equipment is a very minor item, both because the wear rate is low and also because the operation is simple.

There is wide flexibility of cleaning, since the degree of etch can be widely varied and the type of equipment used can be automatic or manual.

Disadvantages indicated

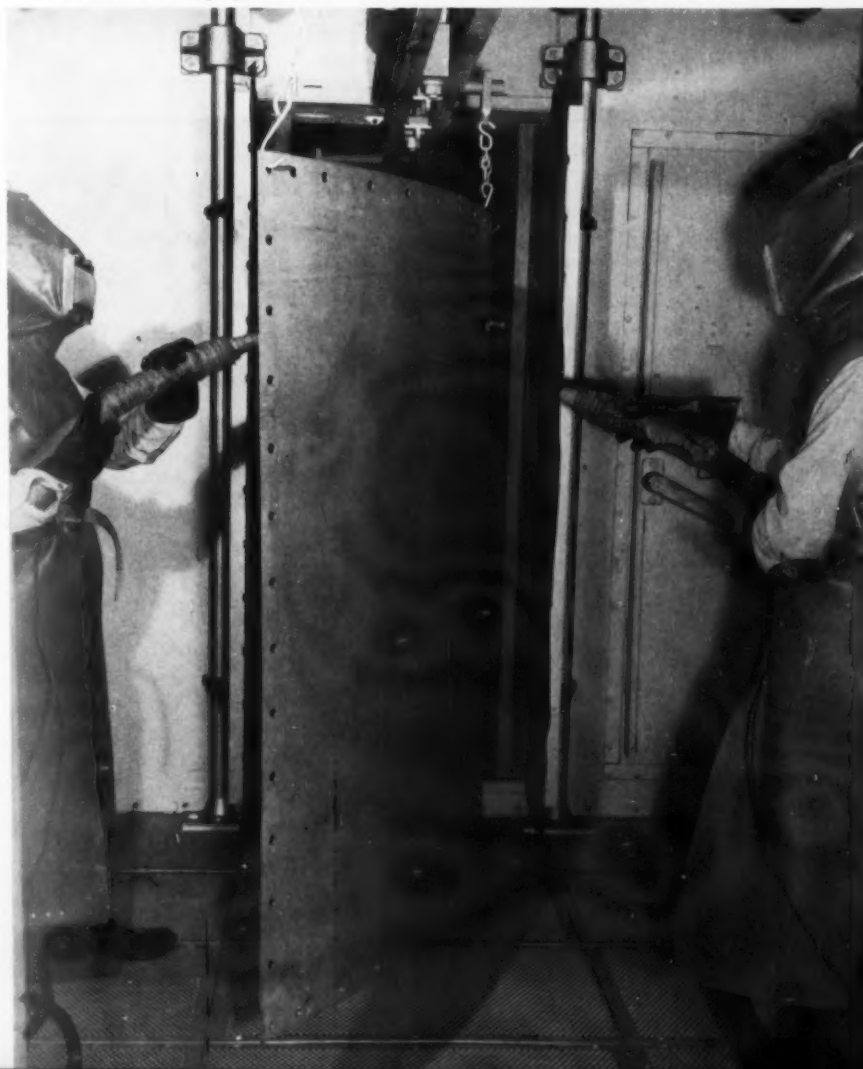
This is a new method; therefore, each new application will have to be given careful study and control. The blasting conditions, if varied widely, will produce porcelain enameling defects and the high re-use ratio of the grit makes contamination of the grit more serious. The cleaning is limited by the design of the part and the gauge of the metal. The ingenuity of the cleaning equipment manufacturer

is challenged and further research is needed to reduce this restraint.

A careful search of the literature failed to reveal that any comparable work had been presented. This was expected, because the only abrasive used was a low carbon steel grit only recently available in quantity. Further, there was no reference that sheet steels for porcelain enameling

had been commercially cleaned by chilled cast iron grit blast. It should be emphasized that no cast iron grit, but *only steel grit* has been used in this investigation. The low carbon steel grit was first introduced to us by a manufacturer of blasting equipment. With this start, and through close cooperation, this new method has been developed. What has been

Photo shows equipment and method used in grit blasting sheet steel parts.



learned in applying special purpose ground coats can be useful to the entire field of porcelain enameling.

Experimental evaluation

In our research laboratories many experiments have been made to study blasting conditions and abrasives. While silica sand was used in large tonnages, tests were being made to get an abrasive that would not require the careful control for workers' health and one that would also be competitive in cost. These points had

to be reached without any sacrifice in quality of cleaning. This research, while negative, did indicate those factors in air blasting procedures that affect the results of the blast.

Factors affecting air blasting

Abrasive particle size
Air blasting pressure
Angle of impingement
Blasting time
Residual abrasive left on the work
Nozzle size
Nozzle to work distance

Initial test work had been done with sheets "wheelabrated" with steel grit. However, the production equipment used air blast and here the comparison could be made directly with silica sand in other air blast equipment. The "wheelabrated" sheets had indicated that the defects on the coated and fired parts would be: copperheads, fishscales, and poor adherence. Changes in frits, mill additions, and controlled atmosphere firing were also known to affect these defects. The blasting conditions finally fixed for the grit blasting were those conditions indicated by research as being important.

Abrasive particle size was generally smaller than with sand, but this is no objection since the various mesh sizes are readily available. The original mixture was equal parts of #50 and #70 mesh. As the material broke down, additions of only #50 mesh material were made. Recent work has indicated that some #40 mesh can be used for make-up. This should result in still longer life for the abrasive. The particle sizes of the steel grits are shown in Table I.

The air blasting pressure was reduced until the degree of etch was comparable with that of sand blast. At about one-half the value for sand blast, the steel grit etch was comparable. This was at 45 pounds per square inch.

At an impingement angle of about 30° the best results were obtained. At this point there is maximum erosion and imbedment is at a minimum. Erosion data has recently been reported by Stoker*.

Over-blasting for longer time with steel grit became especially serious if the operating conditions were not controlled.

Residual abrasive was an initial production problem because copperheads were being formed from the abrasive blown off the conveyor chain onto the wet coating during spraying.

Nozzle size was increased in order to reduce the degree of etch. A one-half inch nozzle was selected for production use.

Below ten inch nozzle-to-work distance, imbedment of the steel grit was

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Table I
Data on Low Carbon Steel Grit

Material, Amount Retained On Sieve Mesh	#40 Grit	#50 Grit	#70 Grit	Average Material in Use in Blaster
#30	1.0			
#40	58.5	2.7		1.4
#50	39.5	68.3		35.6
#70	1.0	27.5	70.9	33.1
#100		1.4	21.9	24.2
#200			6.6	5.2
Pan		0.1	0.6	0.5

Table II
Cost of Abrasive in Air Blasting

	Steel Grit	Silica Sand
A. Purchase Price of Material Per Pound		
1. Material cost	\$0.1550	\$0.0020
2. Handling — new and scrap	0.0050	0.0020
3. Total cost — ratio of cost 40 to 1	0.1600	0.0040
B. Consumption of Material/Sq. Ft. Cleaned		
Pounds of abrasive used —03 lbs.	2.10 lbs.
Ratio of use 1 to 70		
C. Cost of Abrasive/Sq. Ft. Cleaned		
Percentagewise	57%	100%
Saving by using steel grit 43%		

Table III
Summary of Costs in Air Blasting

Estimated Cost per Sq. Ft. Cleaned	Steel Grit	Silica Sand
A. Material Cost		
.....	\$0.0048	\$0.0084
B. Burden Costs		
1. Maintenance labor	0.0002	0.0053
2. Maintenance materials	0.0003	0.0051
3. Compressed air (theoretical)	0.0006	0.0023
C. Power for Equipment		
.....	—	—
D. Direct Labor		
.....	—	—
E. Equipment Costs		
.....	—	—
This is a 72% saving for steel grit blast	\$0.0059	\$0.0021
over costs for sand blast.		

Operation and maintenance of spray pickling equipment

operating data and practical suggestions based on three years of operation

By *H. C. Ellinger* • SUPERINTENDENT, PORCELAIN DEPARTMENT, PHILCO CORPORATION,
PHILADELPHIA, PENNSYLVANIA

ALTHOUGH the spray pickling machines now in use vary somewhat mechanically, the basic principles, for all practical purposes, are about the same. This article will deal principally with the type of machine in which the monorail conveyor carries the ware, either held by hooks or nested in a basket, through the sprayed solutions.

The cleaning and pickling cycle to be considered in this article is shown in the accompanying table.

This discussion will cover each stage in this process, describing their control and the reason why each stage is thus controlled. One must bear in mind that with this type of machine the volume of solution in each stage is relatively small, when compared to immersion pickling.

The various cycles

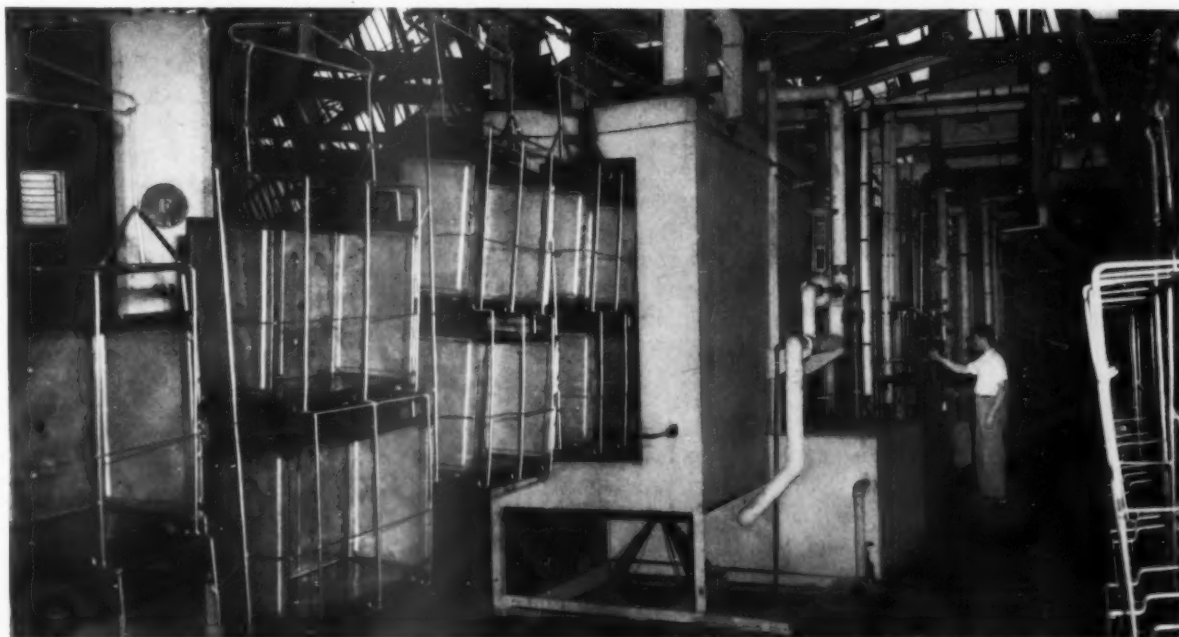
Emulsion Cleaner: The concentration of this solution is 35 parts of water to 1 part petroleum base solvent. The temperature is kept at 150° F. Any higher temperature will volatilize some of the emulsion solvent and retard its cleaning action. To date, no test has been found to check the strength of this solution, but through trial and error it has been determined that a daily addition of 20% of the original charge keeps the solution in condition to do an effective cleaning job. The entire solution is renewed after 80 hours of operation.

Alkali Cleaner: This solution is maintained at 2 oz. per gallon of water at a temperature of 190° F. The solution is very easily main-

tained by small daily additions, the amount determined by titration. It should be pointed out that this cleaner does not contain a special wetting agent. Such a wetting agent would cause too much foaming. The solution is also renewed after 80 hours of operation.

Sulphuric Acid: This solution is also maintained by small additions which are determined by titration. The strength is maintained at 8% and at a temperature of 180° F. Even though the concentration and temperature are somewhat high, there are times when rather heavy weld scale is not completely removed in the 5 minutes. If ware to be processed has heavy weld scale or deep rust, a longer time in the acid solution would be very beneficial. This

Photo shows refrigerator food compartment liners entering a continuous pickling machine.



solution is never renewed, unless some maintenance must be performed to the equipment, necessitating removal of the acid. The natural drag-out seems to prevent a build-up of iron salts.

Acid Rinse: This solution is maintained as nearly as possible at $\frac{1}{2}$ of 1% acid. The normal drag-in from the acid bath will maintain acidity. The fresh water inlet also can be controlled to maintain the desired acidity. The temperature of this solution will vary from tap water temperature to approximately 140° F., depending

storing the solution to its proper pH value. Therefore, it is deemed advisable after 300 hours of operation to renew this solution.

Neutralizer: This solution is made up and maintained at a concentration of .7 oz. sodium cyanide and .7 oz. caustic per gallon, and kept at a temperature of 130° F. Even though this solution is continuously filtered and kept in a clear condition, it is deemed advisable to renew the solution after 16 hours operation, because of the build-up of soluble sulphates. The safe limits of concen-

of a fogging effect in the machine to prevent drying between stages. Also at this pressure, there is very little cooling effect from the sprays. Tests indicate that the ware temperature in each stage is practically the same as the solution in the tank.

Material costs

Because conditions vary widely, as to type of ware processed and local conditions, it is difficult to compare actual costs per square foot from one plant to another. However, the following is the result of three years of operation and study. All figures are for one square foot of steel.

Emulsion cleaner	\$0.0004 = .4 Mills
Alkali cleaner	0.0002 = .2 "
Sulphuric acid	0.0001 = .1 "
Nickel sulphate	0.0011 = 1.1 "
Caustic soda	0.0001 = .1 "
Sodium cyanide	0.0005 = .5 "
Total	0.0024 2.4 Mills

or \$2.40 per 1000 square feet of steel.

Maintenance, cleaning, and servicing

Perhaps the most important service required is the maintenance of the pumps which normally only require a daily check on pump packing and greasing. In 3 years of operation only 2 pumps have been replaced, and it is believed that these replacements were due to improper care. The only part of the machine structure that has deteriorated materially is, as might be suspected, the sulphuric acid section. This section of the structure is rubber-covered, and is standing up well with the exception of spots that have been mechanically damaged. These plates have been repaired by cold patching. It should also be pointed out that the acid section of the machine can be replaced without affecting the rest of the machine.

The most troublesome parts of the machine are the lead heating coils and the lead spray pipes in the acid section. Lead is not a satisfactory material because of vibration and subsequent chemical attack resulting in leaks and other mechanical failures. It is only fair to say, however, that no better material has been suggested. It has been found necessary to replace or rework the lead steam

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Cleaning and Pickling Cycle

Emulsion cleaner	35-1	150° F.	1 Min.
Fresh water rinse to drain	Tap water	Cold	$\frac{1}{2}$ "
Alkali cleaner	2 oz./gal.	190° F.	2 "
Three-stage rinse	Tap water	Cold	1 "
Sulphuric acid	8%	180° F.	5 "
Acid rinse (re-circulated)	$\frac{1}{2}$ % H_2SO_4	Cold	$\frac{3}{4}$ "
Nickel solution	4 oz./gal. 3pH	185° F.	3 "
Sodium cyanide caustic	.75% NaOH	130° F.	1 $\frac{1}{2}$ "
Fresh water rinse	Tap water	130° F.	$\frac{1}{2}$ "
Dryer		225° F.	4 "

upon the type of ware being processed and the amount of tap water necessary to maintain the proper acidity. Although I do not know of any such installation, it is my opinion that some device should be used to automatically control the acidity of this solution.

Nickel: In order to obtain a deposit of five to seven hundredths of a gram of nickel per square foot in 3 minutes, it has been necessary to carry the solution at a concentration of 4 ounces per gallon of single nickel salts at a temperature of 185° F, and at a pH of 3. As far as can be determined, all surfaces of the ware are uniformly coated whether or not they are in the direct line of spray.

The solution is continuously filtered and is maintained for the most part in a clear condition. However, after continued use, the dissolved iron builds up in the solution, and after reaching a certain point, the deposition of nickel is retarded. The safe limits of this concentration of dissolved iron has not yet been determined. Neither have we been successful in revitalizing the solution by raising the pH temporarily, filtering out the precipitate and again re-

tration of soluble sulphates, to our knowledge, has not as yet been determined.

Clear Water Rinse: In this, the last stage of pickling, the solution is re-circulated fresh water at a temperature of 130° F. Fresh water is used in this stage to wash off any salts that remain on the ware. Any salts remaining on the ware, not only dry in streaks, but also affect the set of the enamel in the dip tank. Thus, it has been found to benefit the ground coat operation materially.

General operating facts

Because the ratio of the volume of solution to the square footage of ware processed is relatively low, it is necessary to check each solution every four hours of operation. This condition also demands reliable automatic controls for correct temperatures. Also, because of this relatively small volume of solution, it is economical to renew solutions rather often.

It has been our experience that it is not necessary to maintain a spray head pressure of more than 15 lbs. per square inch. This pressure is sufficient to clean and pickle the ware, and also to produce enough

SAFE TRANSIT progress report

WITH a successful first year of operation behind it, the National Safe Transit Program is continuing to expand its operations in the battle to reduce packaging and

shipping losses on packaged finished metal products. As various phases of the program continue to develop, *finish* will keep its readers informed through progress reports.

Commercial truck line test for SAFE TRANSIT program

A COMMERCIAL truck line test shipment to determine effects of in-transit trucking conditions on packaged finished metal products has just been completed by Norwalk Truck Lines.

Arranged by the American Trucking Association in cooperation with the National Safe Transit Committee, the test shipment initiated at the shipping dock of a major appliance manufacturer in Mansfield, Ohio. The test package was taken to the terminal of the Norwalk Truck Lines, then carried by a Norwalk truck to Chicago. After it was transferred across metropolitan Chicago by local carrier, it was taken back to the Norwalk terminal in Chicago and returned to Mansfield.

The test equipment consisted of a wooden box in which were mounted

two RW-2 ride recorders, one mounted vertical and the other horizontal, thus recording shock laterally, vertically and horizontally, forward and

reverse. The gross weight of this packaged product was approximately 70 lbs.

Similar tests have been conducted by both the Association of American Railroads and Air Cargo, Inc. The combined data will be used by the National Safe Transit Committee in determining the severity of pre-shipment testing procedure for packaged finished metal products to be recommended to manufacturers.

Protective packaging awards made at industrial packaging and materials handling exposition

AT the 4th annual Industrial Packaging and Materials Handling Exposition held in Convention Hall, Detroit, October 4, 5 and 6, some 90 exhibitors of packaging and materials handling developments attracted thousands of visitors, thus marking the Exposition's emergence as one of the nation's top industrial shows.

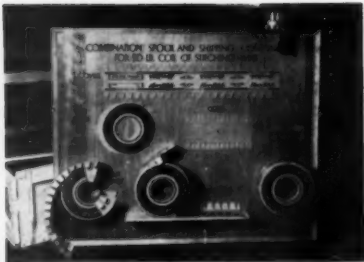
A feature of the Exposition was the announcement of awards in the 3rd annual Protective Packaging Competition (some of the awards are shown

on the following page). In this event, under the chairmanship of A. L. Green, of the Association of American Railroads, prizes were awarded for the best type packages submitted in the following classifications: Group 1—corrugated or solid fibre boxes; Group 2—nailed wooden boxes; Group 3—wirebound boxes; Group 4—general packaging; Group 5—export packaging. Three sets of prizes were awarded in each classification.

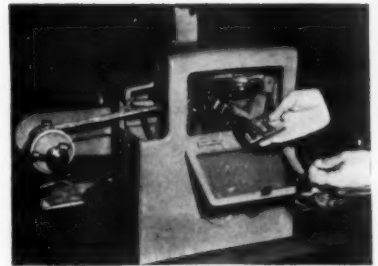
Both the Exposition and the Competition are sponsored annually by

Left to right: Arthur O. Naylor of Arthur O. Naylor & Associates, Oostburg, Wisc.; R. A. Mantz, research packaging engineer for the International Harvester Co., Chicago; W. B. Keefe, packaging engineer for Westinghouse Electric Corp., Mansfield, Ohio and T. A. Carlson, Chief, Division of Material Containers, Forest Products Laboratory, USDA, Madison, Wisc., judges in the Protective Packaging Competition, award 1st prize in the Nailed Wood Boxes class (Group 2) to the Douglas Aircraft Co., Inc. for their very advanced method of packaging DC-6 cabin supercharger transmissions.





Left: First prize winner in Group 4 was Acme Steel Co., Chicago, for a 50 lb. spool of stapling wire package.



Right: An attention-getter at the Packaging Exposition was the new Markem Tape Printer for speedy printing of pressure sensitive tape.

The Society of Industrial Packaging and Materials Handling Engineers. This group is a member of the Industry Committee of the National Safe Transit Program.

Held in conjunction with the Exposition was the 2nd Wayne University Packaging and Materials Handling Institute. Some 250 persons registered for the course whose underlying theme dealt with costs and economies inherent in modern packaging and materials handling methods, with particular emphasis of that theme examined at each session.

Dr. Spencer A. Larsen, chairman of the Department of Business Administration at Wayne University, presided at the Institute's opening session, at which one of the principal speakers was R. F. Weber, general supervisor of materials handling and manufacturing research, International Harvester Company. Weber's topic was "How Labor and Management both Benefit through Engineered

Packaging and Materials Handling."

At other Institute sessions, Henry I. Commes, traffic manager, Kelvinator Division, Nash-Kelvinator Corporation, discussed "Cost to Industry of Damage and Loss Claims," and Charles J. Zusi, of Container Laboratories, Inc., pointed out some "New Developments in Packaging Materials

and Methods." A. R. Schroeder, special representative of the New York Central System, Detroit, pointed out some "Top Problems in Carloading" in his address. Schroeder demonstrated carloading methods for different commodities, illustrating particularly difficult types as well as the conventional.

Changed industrial packaging predicted

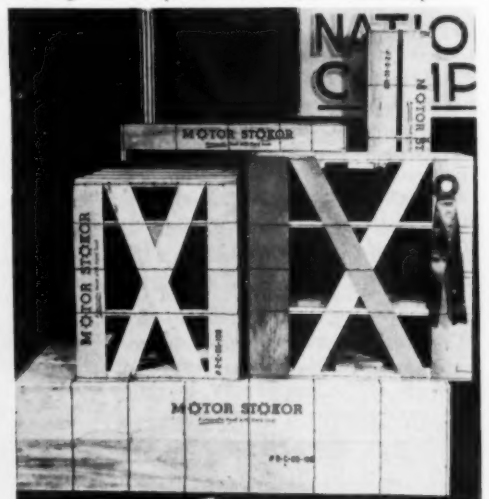
Predicting that stiffer competition in a buyer's market will stimulate top industrial management to reassess packaging programs, Egmont Arens, industrial designer, recently told a group of industrial packaging and materials handling engineers in New York City that "large-scale industrial packaging will undergo significant changes within the next two years."

Arens stated that "Advertising and packaging are not separate and distinct fields. Both play on the same team. The larger a company's adver-

tising investment, the greater burden packaging carries as the logical end-representative of expectations the advertising has built . . .

"Whatever you can do to make your company's products easier for buyers to handle and use is a tangible sales asset. A small change, from your point of view, may mean a vastly improved product in use. The growth of two-portion containers and of prepackaging in the food industry should serve us as an indication that packaging which more fully meets user's needs can be the determining factor on the sales charts."

Left: Harry A. Hunt (right) is being shown why his package entry for the Burroughs Adding Machine Co. won first prize in Group 5 and the Stoller Award. Right: First prize winner in Group 3 was the Hershey Machine & Foundry Co. for a combination of 6 individual boxes containing one complete motor stoker assembly.



Eleventh annual forum for plant men

THE 11th Annual Forum for plant men conducted by the Porcelain Enamel Institute at Ohio State University, Columbus, Ohio, September 14, 15 and 16, was outstanding for several reasons, including peak attendance, quality of program papers, and thoroughness of discussion.

In welcoming the plant men to the Forum, Dr. G. H. McIntyre, chairman of the Forum Committee, said that "the 11th Annual Forum, like all those that have preceded it, is dedicated to promoting greater efficiency in porcelain enameling processing techniques.

"The Forum Committee has constantly striven to fit each program to the existing conditions within the industry. Thus, following the war, the great need was for a re-evaluation of porcelain enameling fundamentals and the Forum program was a refresher course; later, emphasis was on production and utilization of substitute materials and the Forum programs were built around these needs.

"Today the porcelain enamel industry's old established markets have been invaded by strong competitors and, as never before, the industry must fight to hold its position in these fields. The chief defense against the competitive attack will be an efficient plant, and management pressure on the shop operator will be for lower costs and an improved product. This Forum should aid the shop personnel

to achieve these objectives. The topics of the papers for this Forum were selected by the Committee after a

Forum Committee

- G. H. McIntyre, Ferro Enamel Corporation, Chairman
- A. I. Andrews, University of Illinois
- D. S. Beal, The Youngstown Sheet and Tube Company
- W. A. Deringer, A. O. Smith Corporation
- R. L. Fellows, Chicago Vitreous Enamel Product Co.
- S. J. Hemsteger, Briggs Manufacturing Company
- R. M. King, The Ohio State University
- E. E. Marbaker, The O. Hommel Company
- E. F. McDonald, Ingram-Richardson Mfg. Co.
- F. A. Petersen, University of Illinois
- W. H. Pfeiffer, Frigidaire Division, General Motors
- J. A. Schieffeler, Refrigerator Division, General Electric
- N. H. Stolte, The Enamel Products Company
- P. Stuft, Pemco Corporation
- G. N. Tuttle, Benjamin Electric & Mfg. Co.

careful survey of the industry's requirements, and outstanding technical experts with a wealth of practical ex-

perience were asked to present them.

"It is the sincere hope of the Committee that this Forum, together with recorded Proceedings, will prove to be—like its predecessors—a real contribution to the progress of the industry."

Program covers wide variety of subjects

Following an address of welcome by Dean Charles E. MacQuigg, of Ohio State University, and a response by C. D. Clawson, president of Ferro Enamel Corporation and president of the Porcelain Enamel Institute, the first afternoon session swung into full speed with papers on "Low Temperature Enamel Firing", "Low Temperature Enamel Furnaces", "Avoiding Enamel Defects through Proper Operation of Furnaces," and "Grit Blasting Sheet Steel Parts for Porcelain Enameling." These were presented in order by P. M. Wheeler, Chicago Vitreous Enamel Product Co.; Slade Gamble, Lindberg Engineering Company; M. J. Bozsini, Ferro Enamel Corporation; and E. C. Ploetz, A. O. Smith Corporation. A. E. Raeuber, Jr. collaborated on the latter paper.

This first session was presided over by Prof. R. M. King, Department of Ceramic Engineering, Ohio State University.

W. H. Pfeiffer, materials and process engineer, Frigidaire Division of

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Seated at speaker's table at annual banquet are, left to right: D. G. Bennett, University of Illinois; W. H. Pfeiffer, Frigidaire; Edw. Muckasek, PEI; F. F. Gregory, A. O. Smith Corp.; G. H. McIntyre, Ferro Enamel; Charles Pearce, ACS; R. M. King, Ohio State University; and F. A. Petersen, University of Illinois.

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W. L. Reynolds and Edward Flack, Erie Enameling; Wm. R. Lindner, Erie Ceramic Arts; and Lewis Martin, O. Hommel Co.

Curt E. Hoerig and Wm. Lampiris, of Geuder, Paeschke & Frey; John Oliver and Elsie Olen, Porcelain Enamel Institute.



V. D. Frechette, Alfred U.; Forrest R. Nagley, Bureau of Ships, U.S.N.; Stanley C. Orr, Pfaudler Co.; Elias Jones, Ferro.

C. J. Harbert and Fred Maynard, Harshaw Chemical; Wm. Anderson, Titanium Pigment; and Waldo W. Higgins, A. O. Smith Corp.



SNAPSHOTS FROM THE PEI FORUM



Max Reynolds, W. F. Chambers, J. R. McNay, and Harry F. Shannon, all of Carnegie-Illinois Steel Corporation.

finishfotos

Ship Davis and Hollis Saunders, of O. Hommel Co.; E. B. Flowers, The Warren Co.; and Roy Beck, O. Hommel Co.



James McKinnell, Locke, Inc.; Hal Connare, Ferro Enamel; Don Weaver, Welbilt Stove; and Paul J. Klein, Columbus Porcelain Enamel.



John Krivec, Murray Corp.; E. C. Seabright and George Guerrini, Philco Corp.; and M. J. Bozsini, Ferro Enamel Corp.

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E. C. Dexheimer, Nesco; H. C. Arnold, Federal Enameling & Stamping; John T. Roberts, Crane Co.; and J. C. Richmond, Bureau of Stds.



W. F. Stark, Lorain Metal Treating; Wm. Harrison, Bureau of Stds.; Don Beal, Youngstown Sheet & Tube; and G. E. Terry, Hotpoint.



A review of de-enameling practice

including detailed accounts of various methods that have been tried

By Dr. G. H. Spencer-Strong • VICE PRESIDENT AND DIRECTOR OF RESEARCH,
PEMCO CORPORATION, BALTIMORE, MARYLAND

IN considering the subject of enameling, two specific questions present themselves. First, is de-enameling worth-while, and second, if so, what are the most satisfactory methods? From a theoretical standpoint de-enameling would appear to be a valuable process. Obviously, fabricated parts, as they reach the enameling operation, represent an investment in time, labor, and materials. The salvaging of these parts after they have been enameled and condemned as scrap should represent not only a saving in material and investment but also should eliminate the requirement for a duplication of all the operations up to the enameling plant. That this simple analysis of the problem has appealed to enamelers, or at least to management, for many years is readily demonstrated by a brief review of the literature. Here we find that there have been many articles covering the subject over a period of the past 40 years. It is interesting to note, further, that in almost every case the author begins his article by discussing and usually condemning all the prior art, following which he describes a process which he feels will eliminate all the previous drawbacks found in the de-enameling process. In practically

every case the author has put himself on record as believing that de-enameling represents a very important and extremely worth-while process in the enameling art. At the same time the problem of de-enameling has presented itself as a challenge to the ingenuity and the inventive genius of persons concerned with it over the years.

There appears to be only one type of de-enameling in general use which has not been covered by patents. This is sand-blasting, which apparently is so obvious that no patent office would consider that it amounted to invention.

Is de-enameling desirable?

It will be noted that there has been a considerable interest in the de-enameling operation, as well as a great deal of constructive work looking toward the solution of the problem. Although a few of the authors of articles have set forth process costs, it is interesting to note that none of them actually set down a real thorough-going analysis of the pros and cons of de-enameling. To the casual observer it might appear that a simple analysis of the economics of the situation, that is, a balance sheet comparing the total cost of the article

to be de-enameled with the cost of the actual operation, would provide a satisfactory answer to our first question of whether de-enameling is worthwhile. Using this basis of reasoning, it would appear that any article which cost approximately 6¢ per square foot of enameled surface to fabricate should be worth de-enameling. However, a discussion of the problem with enameling plant operators who have had experience with de-enameling indicates that the problem is not nearly so simple. There are many hidden factors which must be considered carefully, with the result that a considerable number of experienced de-enameling operators are now of the opinion that de-enameling is worthwhile only for the salvaging of special or very costly parts, but not as a general-run operation, even though a balance sheet saving might be realized.

De-enameling merry-go-round

Although the literature shows a number of cost breakdowns in which the cost of the de-enameling process ranges from 3 to 5½¢ per square foot, at least one of the actual users of the process has claimed that it is impossible to determine accurately the cost of the operation in view of

A Comparison of De-Enameling Methods

Method	Acid		Molten Caustic	Boiling Caustic	Sand Blast
Agent	12% HCl or 10 to 12% H ₂ SO ₄	10% H ₂ SO ₄ combined with sand blast	NaOH	NaOH, 8 to 15 lb. per gal. of water	Sand-air
Time per unit	10 to 12 hours	2 to 2½ hours	15 to 90 min.	10 hours	20 to 50 sq. ft./hr.
Heating medium	Steam	Steam	Electricity	Steam	None
Tank	Acid-resistant	Acid-resistant	Heavy steel plate	Steel	None
Limitations	No acid-resistant enamels	No acid-resistant enamels	No lead bearing enamels. Nickel flash may require special treatment	Nickel flash requires special treatment	Design of parts may effect efficiency
Possible defects	Acid blisters	None known	Alkali carryover	Alkali carryover	None reported

the fact that the time required to de-enamel depends upon a number of factors including the type and application weight of the enamel involved, the contour of the ware, and the condition of the solution. Furthermore, in many cases it has been shown that the same parts may be found to be going through the de-enameling cycle time after time. Few, if any, of the operators, especially those using chemical de-enameling methods, would admit that the ware produced after de-enameling was first-quality ware. Another complaint concerning the de-enameling operation lies in the fact that it presents a mental hazard in the production of a maximum quantity of first-quality ware. Obviously, it is less expensive for the enameLER to wash off damaged ware before it is fired than to fire same and then de-enamel. Similarly, it is less expensive to scrap ware which has faulty welds, dents, and other fabrication defects before it is enameled than to de-enamel it once and possibly two or three times before the ware is finally scrapped anyway. In most plants having a de-enameling operation, plant operators have found that the tendency of personnel to take a chance on ware which appears to be defective, rather than to reject it and take it off the line at the point of discovery, is greatly increased by the knowledge that, even if the results are rejected by final inspection, the ware can always be de-enameled. It would appear that this psychological handicap is very real and for this reason at least two fairly large enameLING plants have discontinued de-enameling entirely, with the exception of extremely complicated or expensive parts. In many other plants only those parts which are costly and difficult to replace are de-enameled.

Finally, most de-enameling operations give rise to extremely unpleasant working conditions, both from a standpoint of comfort and physical well-being of the operator. It is obvious, therefore, that the decision as to whether de-enameling is worth-while or not is a great deal more complicated than a simple accounting operation. Whereas, in times of scarce metal, it may be extremely desirable

to salvage as much scrap as possible, it is not desirable to produce unnecessary scrap nor to produce ware which may not only be faulty when de-enameled but which may give rise to contamination leading to difficulties all along the line.

Chemical de-enameling

There are two general methods of de-enameling. First, by chemical solution, and second, by mechanical removal. Of these, the chemical solution methods have received by far the most attention in the past. Among

Editor's Note:

In considering cost figures, please note that the paper on which this article is based was presented in 1946. Other general principles are just as applicable today.

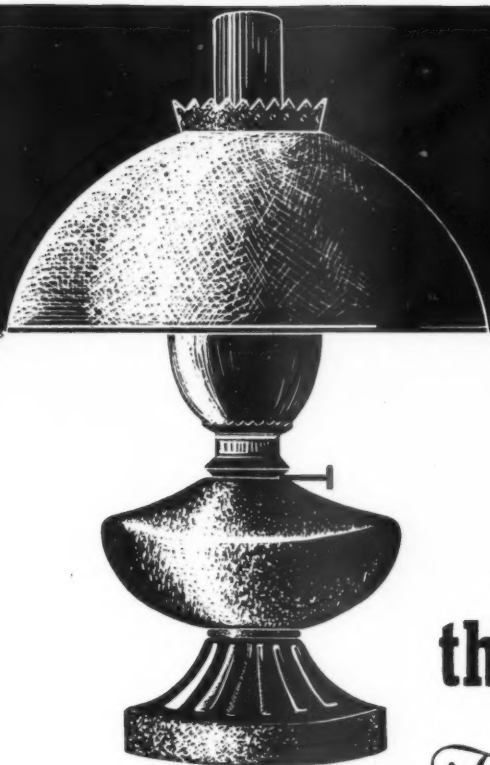
the various processes which have been proposed for chemical de-enameling, we find, first, the use of acids including muriatic, sulfuric, chromic, acetic, and hydrofluoric. Second, there are a group of methods calling for the use of caustic alkalies including both molten caustic and boiling water solutions, and finally, a method employing the use of anhydrous hydrogen fluoride. A number of other procedures including combinations of other treatments have also been tried. Thus, for example, one patent proposes that the enamel be removed by heating to redness in contact with potassium cyanide, followed by water solution. Several other methods treat the ware with acid (usually hot sulfuric) and follow with an alkali bath. One inventor fluxed off the enamel by painting the ware with a paste consisting of a mixture of the hydroxides and/or carbonates of soda and potash, followed by washing in water. In Europe, the use of acids, and especially mixtures of hydrofluoric and sulfuric acids, appears to have been quite popular. Although the first recorded use of molten caustic is contained in an United States patent, it appears that the first use of boiling caustic solutions is reported in the German literature. It is interesting to note that the boiling caustic

de-enameling was carried on at a very high pressure, sometimes as much as nine atmospheres.

Molten caustic de-enameling

Of all these methods, there are only three which are in general use today. The first method is probably the oldest of all the de-enameling processes since it was the subject of the first United States patent on de-enameling, U. S. patent No. 528,156 issued October 30, 1894, to one G. W. Goetz, and calling for the removal of the enamel from metal by immersing in a molten bath of caustic alkali. In this process the ware is de-enameled in a large heavy-walled steel tank, electrically heated and filled with molten caustic. The process is very rapid during the early stages of the process but slows down considerably as the tank becomes saturated with sludge. Thus, it may be possible to de-enamel in a very few minutes during the first hour or two, but after five to six hours the time required increases rather rapidly. Therefore, it is the custom of operators using this method to allow the tanks to sit idle at the end of about eight hours of operation so that the sludge may settle. In some cases the power is turned off and the tank allowed to cool for five or six hours, following which the heat is again applied and, as soon as the operators report for work in the morning, they remove the sludge from the tank, recharge it with caustic, and begin operations, about six hours being available for active operation. After de-enameling, it is necessary that all the caustic be removed from the ware and, in spite of the best efforts of the operators, this is a rather difficult procedure. The operation of this particular type of unit has four drawbacks. First, it can be extremely dangerous. The molten caustic is carried at a rather high temperature and is explosive in contact with water; second, the life of the tanks is not too long, a 1/2- to 3/4-inch steel shell having the life of 9 to 12 months; third, no lead enamels may be used with this process since the lead spreads as a thin film over the surface of the metal. The

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They have perfected new dies and equipment that can produce almost any size top . . . which means that we may be able to eliminate the need for Appliance Manufacturers to go to the expense of forming special dies for appliance tops.

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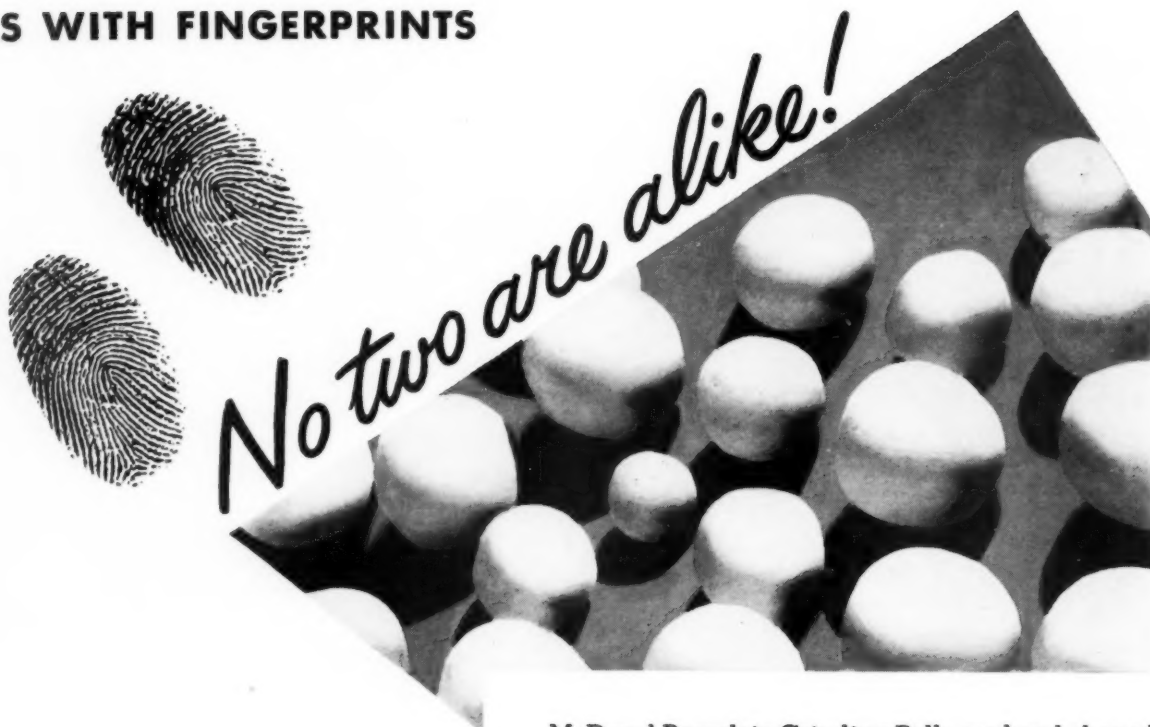
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Exclusive representative of the Enameling Industry.

Grit blasting sheet steel parts

(Continued from Page 26)

noted. At six inch distance the copperheading became objectionable.

These variations in the blasting procedure secured a satisfactory surface for the application of special purpose ground coats; however, several additional precautions might be used with the more conventional porcelain enamels, such as:

Higher bubble burning clay as a mill addition

Controlled atmosphere firing

What was originally found in the research laboratories was then substantiated in production. To date, nearly one million square feet of surface have been satisfactorily cleaned with this method.

Economics—comparing sand and steel grit blasting

Comparable figures are available from production records for sand and steel grit blast. These figures have

been reduced to standard units for ease in comparison with other methods of cleaning and are presented in Tables II and III.

From Table II it is seen that while steel grit costs 40 times as much as silica sand, it does 70 times the cleaning before being discarded. A still greater cleaning life is expected if some #40 mesh material can be used as an additive, rather than all #50 as at present. The discarded material looks promising for a salvage operation, for even today scrap steel prices are around \$20.00 per ton.

Table III shows that both material and burden costs are far less for steel grit blast than for silica sand blast. In total, this indicates a 72% saving of the costs now shown for sand blasting. Power, direct labor and equipment costs are assumed to be equal for the two methods; however, cleaning equipment companies have indi-

cated that silica sand is a more expensive material from these standpoints.

Summary

Grit blasting sheet steel parts has been shown to have several highly competitive advantages over other methods of cleaning for porcelain enameling. The chief disadvantage is that which limits its application, because of design of part or gauge of metal to be cleaned. This limit is a challenge to companies making blast cleaning equipment.

The economics are shown to be highly competitive with sand blasting and perhaps with other methods of metal cleaning as well.

What has proved successful for metal cleaning for the application of A. O. Smith ground coats can probably be used with equal success by porcelain enamellers for other applications.

*Stoker, R. L. "Erosion Due to Dust Particles in a Gas Stream" Ind. & Engr. Chem. 41, Pages - 1196-1199 (June 1949).

Adapted for finish from a talk before the Eleventh Annual Forum of the Porcelain Enamel Institute.



"... and not only these but many other educational novelties to keep the harassed executive amused and relaxed!"

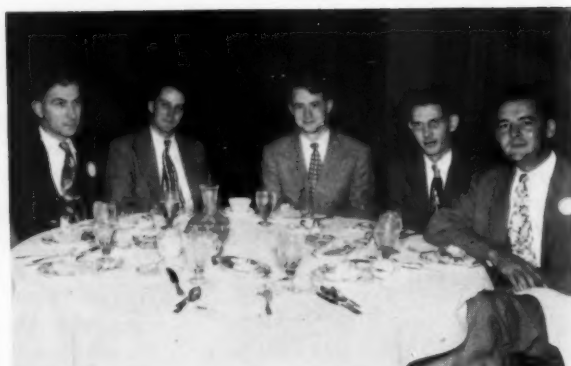
Mechanizing the frozen food cabinet

In a patent issued August 2, 1949, to M. F. Weber, of Harvey, Illinois, is described a mechanical arrangement designed to take the "work" out of using frozen food storage cabinets in the home.

The invention relates particularly to a movable shelf structure within the food compartment with the shelf structure being raised and lowered by motor operated mechanical means.

With this invention, the individual food packages are placed on the shelves and the entire shelf structure is then lowered into position within the food compartment. When it is desired to remove food packages, this shelf structure is again raised from the food compartment so that the food is readily accessible.

Mr. Weber, the inventor of this device, is a member of the organization of the American Stove Company.



SNAPSHOTS OF CHICAGO DISTRICT ENAMELERS



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Chicago district enamellers

discuss cold forming and deep drawing of sheet steel

THE first meeting of the 1949-50 season for the Chicago District Enamellers Club was held Friday evening, September 30, at the LaSalle Hotel.

Following a dinner, Club members heard R. S. Burns, assistant director of Armco Steel Corporation's research laboratories, discuss "Cold Forming and Deep Drawing of Sheet Steel." This was followed by a movie on stainless steel, "An Orchid for Mr. Jordan," presented through the courtesy of U.S. Steel Corporation.

Mr. Burns began his talk by discussing the cold forming of steel sheets, then got down to some points of vital interest to enamellers—drawing quality.

The following constitute drawing quality, stated Burns, "uniformity of properties of the metal, uniformity of gauge or thickness, uniformity of surface roughness, uniformity of lubrication in drawing, and uniformity of press action (hold-down and clearance).

"Very broadly there are three kinds of deformation involved in fabrication. They are: stretching, upsetting, and ironing. People have often asked why we do not have a test for drawing quality, and there have been many proposed. We have not yet seen a simple test that may be substituted for the complex deformations involved in some drawing operations.

"Common procedure in steel mill practice is to establish standard methods of processing and to hold the processing very closely within these given limits. Control testing then is adequate to insure that the material has reasonable drawing quality if it has been held within certain production control limits.

"Actually, drawing quality is a

frequency concept—that is, how many good parts can be made from a thousand blanks. Let us assume



R. S. Burns

that we are competing on some drawing job. I have seen instances where my company is fourth among competition with less than 1% scrap on a given job. On others, we have been first among competition with 8 to 10% scrap. Some fabricators have reason to accept such breakage instead of making the part by other methods, such as multiple parts and welding, or multiple draws.

"Even assuming that we had a perfect test for drawing quality, we would have to test each sheet in a given lot at least once to determine

variations in breakage or scrap which amount to 1/2%.

"In pure stretching operations, the amount of deformation possible varies somewhat among sheets of the same lot. . . .

"We are now gathering data for the wedge draw test comparable to tub draw or cup.

"As is usual where rapid progress has been made, the art in many cases has preceded the science, and were it not for the wholehearted cooperation of the fabricators, stamping shops, and enamellers, it is quite doubtful whether the development of wide sheets would be as far along as it is at the present time.

"It is general sheet mill practice to have mill representatives and metallurgists frequently visit the sheet-consuming industries so that any slight adjustments that are required in the sheet production methods can be made as the need arises. This enables the mill to understand clearly the customers' requirements and to make changes in processing of material to meet specified requirements. In most cases, the cooperation between the consumer and the mill has been so complete and satisfactory that it has been found unnecessary to write restrictive purchasing specifications covering the physical properties and chemistry of the sheets, the main requirement being that the sheets should be satisfactory for the job insofar as breakage, and surface after drawing and enameling are concerned. The sheet manufacturers have, and are continuing to cooperate with the users of sheets to meet new requirements and to improve the present products. We admit though that there is still much work to be done in the steel plant," concluded the speaker.

Central Enamellers Meeting

The next meeting of the Central District Enamellers Club will be held at Hotel Allerton, Cleveland, Ohio, Friday, November 4, according to M. Bozsin, secretary-treasurer.

American Gas Association

holds thirty-first annual meeting

Hugh Cuthrell elected president at convention in Chicago

AT the 31st annual convention of the American Gas Association, held in Chicago the week of October 16, Hugh H. Cuthrell, vice president of The Brooklyn Union Gas Co., was chosen to head the Association for the coming year.

The thousands in attendance at the annual meeting of the six billion dollar gas industry included representatives of gas appliance manufacturers, natural gas transmission firms, and gas utility companies through the country.

The new president, Mr. Cuthrell, served during the past year as first vice president of the Association and was chairman of the General Promotional Planning Committee, which



G. F. Mitchell, new 2nd v.p.

was responsible for the effective coordination of promotional activities of the entire gas industry. Under the direction of this committee, the industry is said to be experiencing one of its best years in sales of gas and gas appliances.

Other officers elected

Other new AGA officers elected were: D. A. Hulcy, president of Lone

Star Gas Company, Dallas, first vice president; and George F. Mitchell, president of The Peoples Gas Light and Coke Co., Chicago, second vice president. Edward J. Barrett, president of Long Island Lighting Co., was reelected treasurer.

New directors include: Stanley H. Hobson, president of Geo. D. Roper Corp., Rockford, Ill., and R. H. Lewis, president of Ruud Manufacturing Co., Pittsburgh, Pa.

Research advances industry

Robert W. Hendee, president of Colorado Interstate Gas Co., and retiring AGA president, stated in his address to the Association that "The '49 Round Up" finds the gas industry at an all-time high in its service to the nation, with an increase of more than one million utility gas customers since the same time last year.

Hendee pointed out that the Association's promotional campaign is being backed up (under the PAR Plan) by a research program which now includes 40 active projects. These cover various phases of gas production, natural gas and domestic, industrial and commercial gas utilization. AGA research committees are staffed by technicians and executives from 100 utility companies with more than 200 persons contributing their time and energy to this program which is underway at the Institute of Gas Technology, AGA Laboratories, and ten other scientific and educational institutions. Hendee pointed out that the AGA Testing Laboratories had been an important factor in the improvement of gas appliances in the 23 years of its operations.

"A steady flow of research accomplishments has injected new energy into the life stream of the gas industry and has opened new vistas of



H. H. Cuthrell, new president

progress. After four years of practical results, PAR's gas production and general technical research studies are bringing immediate dollar returns valued at more than double the money invested," stated Hendee.

Operation enterprise

In his talk "Operation Enterprise"

Photo shows part of crowd attending the annual AGA home service breakfast at which all branches of the industry were represented.



presented before a general session, Frank J. Nugent, sales manager of heating equipment, Ingersoll Steel Division, Borg-Warner Corp., and retiring president of GAMA, outlined the aims and achievements which the Gas Appliance Manufacturers Association is carrying out for its members which consists of over 550 manufacturers of gas appliances and equipment. (These GAMA members in turn supply 3000 wholesalers, 60,000 dealers, 1000 utilities, and 20,000 other industries which, in turn, all serve the public, Nugent pointed out.)

Some of GAMA's main objectives, mentioned by Nugent, are: to establish and administer fair trade practices; to promote cooperative relations with gas utilities, distributors, appliance equipment dealers and customers; to promote cooperation among its members for proper use and increased distribution of gas and gas appliances; and to further the interest of manufacturers of appliances, accessories, apparatus and supplies used in the production and distribution and use of all types of gases.

In an address before the Residential Gas Section, Harold Massey, assistant managing director of GAMA, stated that "most of the steps which are necessary to cope with the return of the so-called 'buyer's market' in our industry have been taken, or are well underway.

"As a result of several post war planning surveys that were made by our manufacturers during the later years of the war, several new or greatly improved appliances have made their appearance and are now



D. A. Hulcy, new 1st v.p.

available to build load and dealer sales."

New appliances spread peak load

Massey pointed out several new gas appliances which could be classed as "subsistence items" which "people buy of necessity". They are the automatic clothes dryer, the incinerator, and the all-year air-conditioner. He said that many utility companies now can't meet the winter load because summer demand is too

low to justify new construction. Use of more new gas appliances, particularly the air-conditioning units, would help alleviate this condition, emphasized Massey.

GAMA divisional chairman named

Stanley H. Hobson, of Geo. D. Roper Corp., president of the Gas Appliance Manufacturers Association, announced the appointment of chairmen to head the various GAMA divisions and groups.

The new appointments are: J. F. Ray, vice pres., in charge of sales, General Controls Co., Glendale, Calif., chairman, Controls & Related Accessories Division; L. O. Reese, vice pres. & gen mgr., Armstrong Products Corp., Huntington, West Va., chairman, Direct Heating Equipment Division; W. H. Muhlbach, director of distribution research, Florence Stove Company, Gardiner, Mass., chairman, Domestic Gas, Range Division.

H. E. Jalass, vice pres. & gen. sales mgr., Cribben & Sexton Company, Chicago, Ill., chairman, "CP" Manufacturers Group; C. H. Rippe, Jr., Hamilton Manufacturing Co., Two Rivers, Wisc., chairman, Gas Clothes Dryer Division; I. E. Seith, production engr., The Forest City Foundries Co., Cleveland, Ohio, chairman, Gas House Heating & Air Conditioning Equipment Division; John K. Knighton, Servel, Inc., Evansville, Ind.,

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OPAX S in High Fire Zirconamels

REFLECTANCE VALUES INCREASED UP TO 2%

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Our trained field engineers are available to assist in the application of OPAX S. They welcome the opportunity to work with you.

High Scratch Resistance

Color Stability

Improved Finish

Typical High Fire Zirconamels

TYPE	MILL ADDITION OPACIFIER	Reflectance values at application weight of		
		35 grams /ft ²	40 grams /ft ²	45 grams /ft ²
A	No Opacifier	74.8	77.0	78.8
	2% Opax S	76.0	78.0	79.8
B	No Opacifier	75.0	77.0	78.4
	2% Opax S	76.5	78.8	80.4

COMPARISON OF
REFLECTANCE VALUES
WITH TYPICAL
HIGH FIRE*
ZIRCONAMELS

*Increases in Reflectance Values with Low Fire Zirconamels are approximately the same.

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NEWS

V. A. Barlow's Porcelain Enamel Company announces the addition of Charles H. Gott to the organization. Mr. Gott (left) to industrial

New promotion man at Briggs

Robert A. Anthony has been appointed director of advertising and sales promotion of the plumbing ware division of Briggs Mfg. Co., Detroit, according to E. O. Brady, general manager. Anthony succeeds O. F. Depperman who resigned to enter the plumbing distribution field.

Resistance welding sales indicates production increases, says Institute

Sales of resistance welding machines in August were 81% ahead of July, according to a report by The Resistance Welding Institute. Actual shipments rose 70% during the same period, with cancellations dropping more than 12%. Shipments of electrodes increased 20%.

The unpredicted increase in the sale of resistance welders brings to an end a steady decline which began earlier this year, the Institute disclosed. Resumption of large scale purchases of resistance welders is viewed as assurance that metal fabricating industries are planning aggressive development of today's competitive consumer markets.

Establish fellowship in ceramic dielectrics at Alfred U.

Establishment of an undergraduate fellowship in ceramic dielectrics by Electrical Reactance Corp. has been announced by John F. McMahon, dean of the N. Y. State College of Ceramics at Alfred University. It was stated that the fellowship will aid in the research and development of

finish NOVEMBER • 1949

the use of titanates and other ceramic materials used in the electronic industry.

Goddard elected IES president



Charles H. Goddard, recently appointed manager of utility sales of the lighting fixture division of Sylvania Electric Products, Inc., Ipswich, Mass., has been elected president of the Illuminating Engineering Society.

Other IES officers, who took office October 1, are: S. G. Hibben, Westinghouse Electric Corp., vice president; E. M. Strong, Cornell University, treasurer; A. H. Manwaring, Philadelphia Elec. & Mfg. Co., general secretary.

Hubbard named vice pres. and gen. mgr. of Electromaster range division

The appointment of Henry H. Hubbard as vice president and general manager of the Electromaster range

division of Philco Corporation, at Mt. Clemens, Michigan, has been announced by William Balderston, president of Philco.

Hubbard joined Electromaster as purchasing agent and after serving in this capacity for several years was elected vice president in charge of plant and manufacturing in 1935. He continued to head this phase of operations after Philco's acquisition of Electromaster in February, 1949.

Lloyd Ginn joins Western Stove

Lloyd C. Ginn, formerly advertising and sales promotion manager of American Stove Company, St. Louis, is reported to have joined Western Stove Co., Culver City, Calif., manufacturers of Western Holly gas ranges, as general sales manager.

Armour research director appointed to National Research Council

William E. Mahin, director of research at Armour Research Foundation of Illinois Institute of Technology, has been appointed a member of the National Research Council for a three-year period ending June 30, 1952. He will represent the American Society of Metals.

J. W. Barker, president of Research Corporation, has announced that Niagara Blower Company has been awarded the license to manufacture dehumidifying and air conditioning equipment under its series of patents covering the removal of moisture from air or other gases by the use of a hygroscopic liquid.

Hundreds of carloads of Apex home laundry equipment on order

Shipments of Apex cleaners, washers, ironers, dryers, and dishwashers are hitting new peaks, C. G. Frantz, president of Apex Electrical Mfg. Co., disclosed in a recent report to company employees. He said that, despite heavy shipments, orders on hand are still increasing and distributors are clamoring for merchandise.

"The newly styled Apex products have proven to have great sales appeal," the letter said, "and many dis-

tributors and dealers are entirely sold out. We have on hand orders for hundreds of carloads and are endeavoring to expedite material deliveries in order to increase our production schedules still further."

Record attendance expected at refrigeration and air conditioning exposition

Advance hotel reservations, letters, inquiries and other signs all point to the fact that attendance at the 6th all-industry Refrigeration and Air Conditioning Exposition in Atlantic City, N. J., November 14-18, will be greater than ever before, according to a report from the exposition management.

"In all our years of experience in putting on all-industry expositions for the refrigeration and air conditioning industry, we have never had a time when so many exhibitors have had so much that is new to exhibit as is true this year," stated Hermann F.

Spoehrer, chairman of the Show Committee.

"It would seem that half of our exhibitors have sent in information indicating they are exhibiting for the first time, at Atlantic City, new types of equipment, new methods and new materials," Spoehrer said.

The exposition is said to be open to any person identified with the industry with no charge for registration.

Advance reservations for hotel accommodations should be addressed to Sixth All-Industry Housing Bureau, 16 Central Pier, Atlantic City, New Jersey.

Plumbing and heating group holds annual meeting

At the 30th annual meeting of the Plumbing and Heating Industries Bureau in Chicago, October 4, George O. Toepfer, president of The Maag Company, Milwaukee, was elected president. Other officers are Jack Cooper, president of Harry Cooper Supply Co., Springfield, Mo., Bureau vice president, and Earl E. Brown, secretary of The Chicago Faucet Co., treasurer. Norman J. Radder, Chicago, continues as secretary.

New directors include: E. A. Cline, head of department of convactor-radiators at The Trane Company, LaCrosse, Wis., representing the Convactor Manufacturers Association; Norman F. Keisling, president of Bailey-Farrell Co., Pittsburgh, representing the Central Supply Association; J. J. Nolan, Jr., vice president of The Central Foundry Co., New York City, representing the Institute of Cast Iron Soil Pipe and Fittings Manufacturers; and Joseph C. Vandermast, manager of tubular sales for Pittsburgh Tube Co., Pittsburgh, representing the Committee on Steel Pipe Research.

The following Bureau directors, representing various associations, were reelected:

Stanley Backner, Universal-Rundle Corp., representing the Vitreous China Plumbing

Fixtures Assn.; Carroll Baumgardner, The National Radiator Co., The Institute of Boiler and Radiator Manufacturers; W. A. Brecht, Hajoca Corporation, the Southern Wholesalers Assn.; Earl Brown, The Chicago Faucet Co., the Sanitary Brass Institute; Nicholas Feltes, Bastian-Morley, Co., the Gas Water Heater Division of Gas Appliance Manufacturers Association.

Arnold Goetz, Kroeschell Engineering Co., the Heating, Piping and Air Conditioning Contractors National Assn.; E. J. Gossett, Bell & Gossett Co., the Hot Water Heating Specialties Mfrs.; John Kohler, Kohler Company, the Enameled Cast Iron Plumbing Fixtures Assn.; A. B. Martin, Kewanee Boiler Corp., the Steel Boiler Institute; R. L. Stewart Stockham Valves & Fittings, Inc., The Pipe Fittings Manufacturers Assn. and The Valve Manufacturers Assn.; George Toepfer, The Maag Company, the National Association of Master Plumbers.

Harry Beglen, American Radiator & Standard Sanitary Corp.; and George Hoffman, Crane Company.

"Much has been said and written in recent years," said E. J. Gossett, retiring Bureau president, "about the importance of merchandising in the plumbing and heating industries. To most of us, merchandising means the full utilization of all the means and devices for aggressive promotion and selling.

"Editorial merchandising is an important part of the general merchandising picture. The object of editorial merchandising is to develop an informed public opinion—a favorable atmosphere in which to carry on the

general merchandising program. The Bureau has helped create this atmosphere by hitting a new high in publicity lineage during the last twelve months," stated Gossett.

Norman Radder, Bureau secretary, pointed out that "The story of plumbing and heating was publicized through such outlets as: home shows, consumer booklets, syndicates and press associations, conventions, slides, libraries, bibliographies, consumer contacts, and special pictorial presentations in national magazines."

Continuing, Radder stated that "One of the outstanding achievements in 1949 was the participation in National Water Systems Month. The month of May was designated as National Water Systems Month by the National Association of Domestic and Farm Pump Manufacturers. The editorial publicity—all of which was handled by the Bureau—was directed to the farmer, dealer, and distributor. The success of this special emphasis period can be judged by noting that a public utility in Pennsylvania, working for a quota of 700 water systems, sold 990 water systems for the greatest volume of pump sales in the company's history."

Norton and Florence Stove honored at Worcester County dinner

Products of Florence Stove Company and Norton Company were among 27 brand names manufactured in Worcester County, Mass., which were cited with "Certificates of Public Service" at a dinner on September 21. Florence cooking stoves and space heaters were awarded a diamond anniversary certificate, and Norton grinding wheels and abrasive products were awarded a golden anniversary certificate.

The dinner was sponsored by the Advertising Club of Worcester in cooperation with Brand Names Foundation, Inc.

List subjects for discussion at first plant maintenance show

Topics scheduled for discussion at the 1st Plant Maintenance Show, to be held in the Auditorium, Cleveland, Ohio, January 16-19, include: "Main-

tenance Organization and Management", "Budgeting the Maintenance Operation", "Selection and Upkeep of Lighting Equipment", "Upkeep of Motors, Controls and Distribution

Equipment", "Using Electrical Instruments in Maintenance", "Upkeep of Floors, Walls and Roofs", "Protecting the Plant", and "Protecting the Worker."

the Texas division, and general sales manager.

Link-Belt opens new plant in Texas



Link-Belt Company, manufacturers of conveyors, chains, elevators, dryers, and power transmitting machinery, has announced that its modern new manufacturing plant in Houston, Texas, is now in operation. Formal opening was held September 27.

"We have long felt the need for this new and larger plant in the Southwest," stated Harold L. Hoffman, vice president, "in order to meet the constantly-increasing demand for our conveyors, dryers, screens, power transmission machinery by industries of the Southwest."

The new plant, comprising 45,000 sq. ft. of floor space, consists of a modern machine shop, structural steel shop, and large warehousing facilities.

Minnesota Mining advances Hatch

Lloyd A. Hatch, vice president formerly in charge of the firm's roofing granule division, has been assigned the job of coordinating research and new product development, according to an announcement by Minnesota Mining & Manufacturing Co.

IFMA mid-winter meeting in Detroit, Jan. 23-24

The mid-winter meeting of the Industrial Furnace Manufacturers Association will be held at The Dearborn Inn, Dearborn, Michigan, January 23 and 24, according to an announce-

ment made by Stewart N. Clarkson, Association executive vice president.

The Association's 20th annual meeting will be held in Hot Springs, Virginia, May 15, 16 and 17, stated Clarkson.

Washer sales reach year's high during August

Factory sales of standard-size household washers in August were greater than in any other month since October, 1943, according to industry-wide figures announced by the American Home Laundry Manufacturers Association.

The August total was 323,789 units, an increase of 61 per cent over 200,900 in July. It was within 10.6 per cent of 362,169 sold in August, 1948, the industry's all-time high year.

August sales of ironers aggregated 32,300 units, compared to 17,700 in July, an increase of 82.5 per cent.

Younger advanced by Atlas Mineral Products

George L. Wirtz, president of Atlas Mineral Products Co., has announced the election of A. Myles Younger as vice president in charge of sales. Younger joined the firm as a chemical engineer in 1939, and in the interim held positions as midwest sales manager, plant manager of the California plant, general manager of

DuPont advances Graves

E. S. Nickerson, general manager of the fabrics and finishes department of the DuPont Company, has announced the appointment of Dr. George D. Graves as director of the department's chemical division. He succeeds John Marshall who died August 27.

Dr. Graves joined the DuPont organization more than 22 years ago. Since 1945 he has been assistant director of the chemical division of the plastics department.

Binks sales appointment

Burke B. Roche, president of Binks Mfg. Co., makers of spray painting and finishing equipment, has announced the appointment of E. J. Cremer as manager of their new sales and engineering office located in the Empire State Building, New York City. This office will serve as Binks' principal headquarters on the Atlantic Seaboard.

Battelle names Minton head of projects development

David C. Minton, Jr., assistant to the director of Battelle Institute, Columbus, Ohio, has been named executive in charge of sponsor relations and projects development, according to an announcement by Clyde Williams, Battelle director. Minton will act in a liaison capacity between Battelle and industrial and governmental sponsors conducting research at the Institute.

Foote Mineral announces new research personnel

Dr. S. C. Ogburn, Jr., manager of research and development, Foote Mineral Company, has announced the addition of five new men to the firm's growing research organization. They are: Harry B. Hunter, metallurgist; J. M. Kishel, chemist in analytical section; Edward Loveland, ceramic research assistant; Dr. Everett R. Johnson, research chemist; and David

Coghlan, chemical engineer in charge of pilot plant studies.

Increasing production of titanium

Increasing production of titanium was disclosed recently by the DuPont Company in a paper presented before titanium symposium sponsored by the Division of Industrial and Engineering Chemistry of the American Chemical Society in Atlantic City, N.J.

The paper was prepared by E. A. Gee, J. B. Sutton, and W. J. Barth of the DuPont organization and was presented by Dr. Gee.

"Today the prospects for a tonnage titanium industry are especially promising," Dr. Gee stated. "Our future plans depend upon the uses developed for it by the metals industry and the volume for which there will be a market. It may be several years before these factors are known."

In his presentation, Dr. Gee dealt primarily with the results of research into the effect of carbon in the metal. His conclusion was that, above 0.25 per cent carbon content in titanium,

increasing amounts of carbon do not appreciably affect strength, but decreases its ductility slightly.

It is from this and other research work that future uses of the metal will be developed. The principal work done to date has been in fields where a high ratio of strength to weight is needed, as in aircraft, and fields where corrosion-resistant material is needed.

American Cyanamid appointments

The appointments of Dr. L. P. Moore as manager of its new products development department, and Dr. E. W. Cook as its European technical representative, have been announced by American Cyanamid Company. Dr. Moore had served as the firm's European representative since 1946, and Dr. Cook had been assistant chemical director since 1946.

Permanente Metals buys three government-owned plants

Permanente Metals Corporation is reported to have bought three gov-

ernment-owned aluminum plants from War Assets Administration for \$36,000,000. Two of the plants are in Spokane, Washington, and the third plant is in Baton Rouge, Louisiana.

Minnesota Mining exec. promotions

Five promotions in top-level management of Minnesota Mining & Mfg. Co. have been announced. William L. McKnight, president of the firm since 1929, was elected to the newly created post of chairman of the board.

Richard P. Carlton, former executive vice president in charge of research, engineering and manufacturing, was elected president. Chairman of the executive committee is Archibald G. Bush, former executive vice president and director of marketing and distribution.

Two new executive vice presidents are George H. Halpin and Herbert P. Buetow. Halpin, former vice president for sales, will continue to direct sales activities; Buetow, treasurer since 1939, is now executive vice president in charge of finance.

It's MISCO for HEAT RESISTING ALLOYS
IN ROLLED MILL FORMS
Sheets — Plates — Rounds — Squares — Hexagons — Bars — Angles —
Channels — Sections — Pipes — Nuts — Welding Rod —

MAKE Your Enameling Fixtures with MISCO METAL—there is no finer Heat Resisting Alloy

Send for—
MONTHLY STOCK LIST
of Misco Rolled Mill Forms available for fabrications like this.

ROLLED PRODUCTS DIVISION
Michigan Steel Casting Company
MISCO 1999 GUOIN ST. • DETROIT 7, MICH.
One of the World's Pioneer Producers and Distributors of Heat and Corrosion Resisting Alloys

Guaranteed Results

in the

Pickle Room

with

Specification Materials

and

Experienced Service

MANUFACTURERS OF

LEPCO PRODUCTS

Suppliers to Porcelain Enameling Plants
CLEANERS • NEUTRALIZERS
DRAWING COMPOUNDS

V. B. PUNDERSON COMPANY

402 SWETLAND BUILDING

CLEVELAND 15, OHIO

Frank T. Tucker, director of advertising of The B. F. Goodrich Company, recently celebrated his 30th year with the organization.

Vitro adds European ceramist to staff as color consultant



John H. Drechsler, Czechoslovakian-born ceramic color specialist, has been named to the staff of The Vitro Manufacturing Company. In making the announcement, A. J. Strod, president, explained that Drechsler will act as consultant on color problems.

Upon receiving a diploma in ceramic engineering from Bohemian State College in Czechoslovakia, Drechsler took post graduate work at Prague University and University of Dublin. Following service with the British army during the recent war, he worked for various ceramic concerns in several European countries.

In 1949, he returned to Czechoslovakia as production manager of the Feldspar Glaze and Color Works, a position he held until he came to the United States in June, 1949. He is a member of both the British and Czechoslovakian Ceramic Societies.

University of Maryland group tours Pemco plant and labs

Forty-two members of the senior class of chemical engineering of the University of Maryland, College Park, Md., toured the manufacturing plant

finish NOVEMBER • 1949

FOR REDUCED STORAGE REQUIREMENTS

Because Wirebound Boxes and Crates are delivered flat, they save storage space, and yield extra work area in the shipping room. For example the All-Bound mats illustrated occupy only 42 cubic feet, but make up into 225 cubic feet of shipping space. See below*

FOR 1-MINUTE ASSEMBLY

At least $\frac{2}{3}$ assembled when they arrive at your plant, most sizes of Wirebounds can be made up, ready to pack in less than a minute. Users regularly report 40-50% savings in assembly time.*

FOR BETTER, SAFER STACKING

The versatility of the Wirebound principle—the strength of steel combined with thinner wood—permits variation of wire gauges, staple spacing, battens and cleats to provide safe structural strength for large and small containers to meet all warehousing requirements. Note*

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50 Wirebound Plants throughout the United States

Wirebound
BOXES & CRATES
FOR LOWER TOTAL SHIPPING COSTS

*Send for this free book! Explains in detail Wirebound principles, advantages, features and describes how Wirebounds are designed to suit every size and shape of product. Mail coupon today.

Wirebound Box Manufacturers Assn., Room 1832, Borland Bldg., Chicago 3, Ill.

☐ Send Booklet of Product Information ☐ Send a Sales Engineer

NAME _____
COMPANY _____ ADDRESS _____
CITY _____ ZONE _____ STATE _____
OUR PRODUCT IS _____

and control laboratories of Pemco Corporation, Baltimore, on Friday, October 7.

Under the direction of Dr. Joseph S. Smatko, the group made the tour in conjunction with the school's department of chemical engineering special study, "Industrial Chemical Technology."

According to Dr. Smatko, this type of industry tours activity was stopped

during the war and was resumed last year. He said that the tour of Pemco was the first of several such tours planned for the fall semester. "It is our aim to give to our students a fundamental background in Industrial Chemical Technology by allowing them to learn from actual practice, close association, and first hand observation," stated Dr. Smatko.

Kaiser completes new Pennsylvania plant

Kaiser Fleetwings, Inc. has announced the change of its name to Kaiser Metal Products, Inc. and the completion of a new \$2,000,000 enameling plant at its factory in Bristol, Pennsylvania.

Henry J. Kaiser, chairman of the board, stated the change of name marks an extensive conversion program which has taken the firm entirely out of the manufacture of aircraft components and into the production of consumer goods and automobile parts.

The change in name will more closely identify the company with its present range of products—kitchen sinks and cabinets, garage doors, storm sash, automobile doors and deck lids, and a line of deep drawn porcelain enamel steel sanitary equipment produced for Sears, Roebuck and Co.

Completion of the new enameling plant, one of the most modern in existence, follows the recent report that Sears, Roebuck and Co. and Kaiser Metal Products, Inc. have completed a working arrangement whereby the Kaiser plant will manufacture porcelain enamelware for the mail-order house on a long-term basis.

The new plant, designed and constructed by Kaiser Engineers, Inc., of Oakland, California, is housed in a 60,000 square foot building across from the present factory on Radcliffe Street in Bristol.

The enameling plant is connected with the main plant by a monorail conveyor system.

It has two enameling furnaces, one of which the company says is the largest electric counter flow type ever built.

Other facilities include bonderizing

equipment, spray painting booths and batteries of driers. The plant has 20,000 square feet of storage space and is served by spur trackage.

Construction of the enameling plant was started in March of this year, the contract calling for structural

steel, concrete floor slabs, pickler foundations, overhead conveyors, electric furnaces, drain lines, conduits and water piping, asphalt paving and cinder surfacing, and an industrial waste treatment plant.

Among new equipment at the Kaiser stamping plant is an 1800-ton press for the drawing of bathtubs and other plumbing ware.

Normal employment in the plant will be in excess of 1000, it was stated.

This is the second change of corporate names to take place recently in the Kaiser industrial organization. The former Kaiser Company, Inc., which operated shipyards and a steel plant during the war, has changed its name to Kaiser Steel Corporation to signify its complete conversion to the production of iron and steel.

Porcelain enameled tower resists destruction by fire



PHOTO COURTESY SAN FRANCISCO CALL BULLETIN

A striking example of the protective characteristics of architectural porcelain enamel is shown in this photograph of a super market in San Bruno, California, which was demolished by fire recently. The tower, still standing, is of wood covered with porcelain enameled panels. It is the only wood construction left intact, and the only section of the building, other than a steel fire wall, still standing.

Architectural Porcelain Construct-

ors, of Oakland, original installers of the porcelain enameled panels (see "Lucky Markets," January, 1948 finish), are now rebuilding the market. They report that with the exception of panels damaged by collapse of the roof and marquee, the porcelain enameled panels need only to be cleaned.

Allied Appliance Co., Boston, has been appointed exclusive distributor

finish 17.5% AHEAD

Business Paper
Volume DOWN

Advertising Age, October 10, 1949

Business Paper Ad Volume Down 8.6% During September

CHICAGO—Although business papers reduced their rate decline, compared with the previous month, advertising volume in September issues was off 8.6%, compared with a year ago, according to the monthly tabulation of lineage figures by Industrial Marketing. August volume was off 9.9%.

The 240 publications reporting carried a total of 26,570 pages of advertising last month, compared with 29,078 pages in September, 1948, issues.

Greatest loss was recorded by the 53 trade publications, with 5,887 pages this year, down 13.7% from the September, '48, total of 6,822 pages. The 141 industrial publications carried 16,937 pages, a decline of 7.9%. Class publications, including 27, showed the smallest decline, 2.2%; they carried a total of 2,425 pages, compared with 2,485 pages a year ago. The 19 export publications were down 4.3%, carrying 1,321 pages last month, compared with 1,381 pages a year ago.

In the first nine months of the year, the 240 publications are off 10.1% in ad volume, with export showing the largest decline of 12.5%. The export group carried 1,321 pages during the nine-month period, compared with 1,485 pages last year, a 12.5% loss. The industrial group, with 148,321 pages, compared with 158,321 pages in the first nine months of 1948, carried down 5.8%. Trade publications carried 52,929 pages, down 5.8%, compared with 58,110 pages, an 8.8% decline. Class papers were off 2.2%, a total ad volume of 26,570 pages, compared with 29,078 pages in 1948.

According to the Industrial Marketing report covering 240 business publications, advertising volume continues to be slightly off when compared to similar periods for 1948. In contrast to this, *finish* advertising continues to lead 1948 by a healthy 17.5%.

The 17.5% advertising gain in *finish* covers a full ten issues for 1949 as compared to the ten corresponding issues in 1948. Add this to the fact that *finish* advertising in 1948 was over 50% ahead of 1947 and the trend to *finish* is apparent.

There's good reason for *finish* being AHEAD. *finish* is the *only* industrial trade publication which completely blankets the major appliance and allied metal products field both circulation-wise and editorially.

More and more companies who have materials, equipment, components or services to sell to this broad market are discovering that one publication — *finish* — can do a more thorough job in helping build sales volume than multiple "broad" publications at various levels.

Important, too, is the fact that the job can be done at extremely reasonable cost.

Dana Chase PUBLICATIONS

360 NORTH MICHIGAN AVENUE • CHICAGO 1 • ILLINOIS
TELEPHONE Central 6-1229

FOR DETAILED
REFERENCE DATA
SEE
INDUSTRIAL MARKETING'S
Industrial
MARKET DATA
BOOK NUMBER

of Norge home appliances in the New England territory. Announcement of the new distributorship was made by John A. Underwood, vice president-sales, Norge Division of Borg-Warner Corp. In addition to Norge products, Allied distributes Youngstown Kitchens, a complete line of table appliances and other products.

Youngstown advances Steigner

Edward S. Steigner, a member of The Youngstown Sheet and Tube Company's metallurgical department for 15 years, has been appointed tubular products development engineer with headquarters in the Campbell Works office building. He will be associated with Karl L. Feters, special metallurgical engineer.

Renown superintendent dies

Edward J. Skinner, plant superintendent of Renown Stove Co., Owosso, Michigan, died recently. Skinner had been associated with Renown from the time he was 16, when he went to work for the company as a stock boy.

He later became a stove moulder, then assembly foreman, and finally factory superintendent, a position he held for the past 10 years.

Spencer heads all Norge manufacturing & engineering



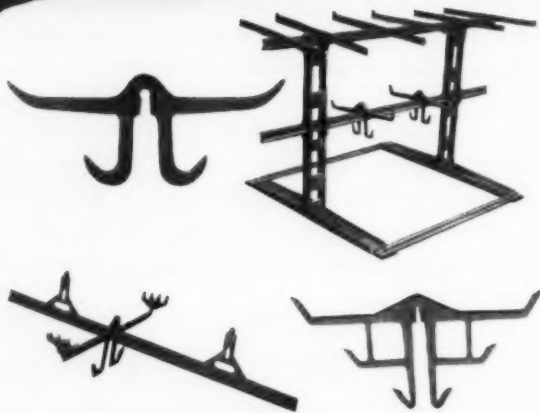
The appointment of Harry L. Spencer as vice president in charge of manufacturing and engineering was made recently by George Smith, president of the Norge Division of Borg-Warner Corporation.

Spencer will have charge of manufacturing in all five Norge plants, according to the announcement.

Spencer rejoined Norge in 1948 after five years with Bendix Home Appliances, Inc., where he was vice president in charge of manufacturing. At the time he left Norge in 1943, he was factory manager of the Muskegon Heights plant where all Norge appliances were manufactured. He was the first manager of national service for Norge, having started with the firm in 1926.

Spencer's headquarters will be in the Norge central offices in Detroit. The five plants of which he will have charge are located in Muskegon Heights, Mich., where refrigerators, freezers and home heaters are made; in Muskegon, Mich., where rollator compressor units are manufactured; the Effingham, Ill., range plant; Herrin, Ill., washer plant; and the Chattanooga, Tenn., plant where water coolers and rollator compressors are made.

If YOU DON'T SEE IT HERE ---- IT'S PROBABLY IN OUR CATALOG



If IT'S NOT IN OUR CATALOG ---- WE'LL DESIGN IT FOR YOU

THE FAHRALLOY COMPANY

150th & Lexington Ave.

Harvey, Ill.

Norge refrigerator with special accessories to hold serum flown to Ecuador



A few hours after the recent Ecuador earthquake, a Norge refrigerator with special accessories for serum and vaccines was flown to the general hospital in Quito. In photo, l. to r., are: George Smith, pres., Norge Div., Borg-Warner Corp., John Underwood, vice pres., and J. W. DeLind, Jr., president, Borg-Warner International.

Ferro appointment

Through its manager, L. H. Miller, the Liquid Plastics Division of Ferro Enamel Corporation has announced the appointment of new representatives in Ohio and Illinois. O. P. "Buzz" Taylor will handle the sales of the firm's organic industrial finishes in the Northern Ohio territory, and G. J. "Joe" O'Rourke will act in a similar capacity in the Chicago territory.

Servel names new p.a.



Servel, Inc., Evansville, Indiana, has announced the appointment of S. L. Nicholson as purchasing agent. Nicholson was formerly assistant purchasing agent and has been with the Servel organization for 22 years.

Eastern enamellers to discuss titanium enamels at meeting in Philadelphia, December 3

"Titanium Enamel and Its Application Direct to Steel" is to be the feature subject at the first fall business meeting of the Eastern Enamellers Club, Hotel Sylvania, Philadelphia, December 3, according to N. R. Klein, Club president.

The subject will be discussed by a "panel of experts" from Westinghouse Electric Corporation, including J. B. Simons, enameling superintendent, R. F. Bisbee, manager of quality control, and C. L. VanDerau, works manager.

Representing research and processing, quality control and results of control tests, and management and costs, the "board of experts" is ex-

ACME STEELSTRAP REDUCES DAMAGE CLAIMS

No shipping damage here! These ranges, load-braced with Acme Unit-Load Bands, traveled from Newark, Ohio, to Seattle, Washington, in perfect condition.



Read how Newark Stove Company reduced damage claims as much as 50%

When a boxcar pulls away from the loading platform of the Newark Stove Company, Newark, Ohio, there's no guessing about how securely its contents are loaded. Ranges are braced with Acme Unit-Load Bands, which bind the shipment into "floating" units that absorb transportation impacts.

This method, developed with the help of an Acme Shipping Specialist, was selected as standard after extensive tests, both with Acme Steelstrap and with conventional bracing using heavy timbers. Invariably, the Acme Unit-Load method proved superior.

Damage claims have been reduced as much as 50% . . . and the shipper and his customers benefit by quicker, more efficient loading and unloading. Why not ask an Acme Shipping Specialist to show you what he can do for you?

STRAPPING DIVISION

ACME STEEL COMPANY

NEW YORK 17 ATLANTA CHICAGO 8 LOS ANGELES 11

ACME STEEL COMPANY, Dept. FI-119
2838 Archer Avenue, Chicago 8, Illinois

- ☐ Have representative call.
☐ Send free booklet, "Savings in Shipping."

Name _____
Company _____
Address _____
City _____ Zone _____ State _____

pected to cover the various phases concerned with titanium enamels direct to steel.

Bisbee, who is also chairman of the National Safe Transit Committee, will give a brief report on the present status of this nation-wide SAFE TRANSIT program for the reduction of packaging and shipping losses.

Nash-Kelvinator Corporation has announced the appointment of Wil-

liam P. Gobeille as superintendent of its plastics plant in Milwaukee, Wis.

August shipment of gas ranges up 64 per cent over July

In a sharp reversal of previous monthly trends, gas range shipments in August jumped 64 per cent over shipments for July, reflecting a major improvement in business conditions and the effectiveness of the gas industry's coordinated nationwide promo-

tional campaign, according to Robert W. Hendee, president of the American Gas Association. Gas range shipments, reported by the Gas Appliance Manufacturers Association, were 187,000 units in August as compared with 113,900 in the previous month.

Finish establishes New York business office



Dana Chase Publications announces that a business office has been established at 545 Fifth Avenue, New York City, with Jack Bain as eastern advertising representative.

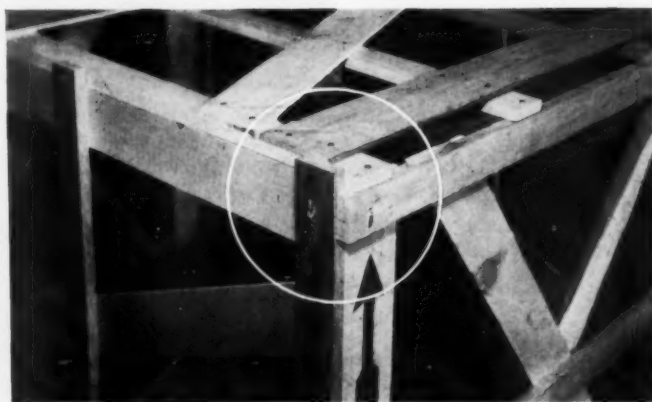
The office was established to offer advertisers and manufacturers serving the major appliance and allied metal products field a more convenient and complete service.

Mr. Bain, eastern *finish* representative, has served both eastern and national advertisers and agencies for 15 years. He was formerly national business manager for the American Electroplaters' Society and publisher of the society's official organ, *The Monthly Review (Plating)*.

ACS student branch at U. of I. elects new officers

The Student Branch of the American Ceramic Society at the University of Illinois held its first meeting of the new school year on October 5. Dr. A. I. Andrews, head of the Department of Ceramic Engineering, welcomed the new students, and introduced faculty members and graduate students to members of the society. Over 80 attended the meeting.

This TIGHT Hinge Corner Makes a STRONGER Crate



The exclusive "Tight Corner" Hinged Crate produced by Bigelow-Garvey offers a degree of rigidity and strength impossible in the ordinary type of collapsible crate. This one feature alone is enough to win the praise of your shipping department. Other features such as pre-drilled nail holes, completely collapsible design, and hardwood construction throughout make for ease of assembly and adequate protection.

Bigelow-Garvey has pioneered in the design and manufacture of crates for safe shipment of porcelain enameled

appliances such as stoves, washing machines, ironers, freezers, sinks, bathtubs and similar products for more than twenty-five years. You get the benefit of this experience when you bring your packaging problems to our engineers.

For domestic packaging or for export packaging in either open or completely closed crates, let us submit our ideas and prices for "safe shipment" containers.

Our crates are built to pass the tests prescribed by the National Safe Transit Committee.

Also

BOX SHOOKS

PALLETS

BULKHEADS

Write us regarding your shipping problems.

BIGELOW-GARVEY LUMBER CO.

General Office and Laboratory

320 West Huron Street • Chicago 10, Ill.

Mills • Arkansas • Georgia • Wisconsin • Minnesota • Washington

Officers elected for the new year are: President, Lucas E. Pfeifferberger; Vice President, Stephen D. Stoddard; Secretary, Charles K. Russell; Treasurer, Ervin W. Schuetze; Eng. Council, Clifton G. Bergeron; Historian, Richard M. Fulrath.

Ill health causes McGee resignation from Renown Stove

Earl McGee, vice president and works manager of Renown Stove Company, Owosso, Michigan, resigned recently on advice from his physician. He joined the Renown organization as works manager five years ago, and a year later was made a vice president of the firm.

GAMA names Hart chairman of marketing committee



F. Donald Hart, executive vice president, Tennessee Enamel Mfg. Co., Nashville, has been elected chairman of the Marketing Committee of the Gas Appliance Manufacturers Association, according to an announcement by H. Leigh Whitelaw, GAMA managing director. D. R. Meckstroth, associate director of sales research, Servel, Inc., Evansville, Ind., was elected vice chairman.

Prominent in GAMA affairs for many years and an active member of the Marketing Committee, Hart is also vice chairman of the Direct Heating Equipment Division and a member of the Gas Floor Furnace Group. He succeeds R. T. Killian, of Bryant

Heater Division, Affiliated Gas Equipment, Inc., as chairman of the Marketing Committee.

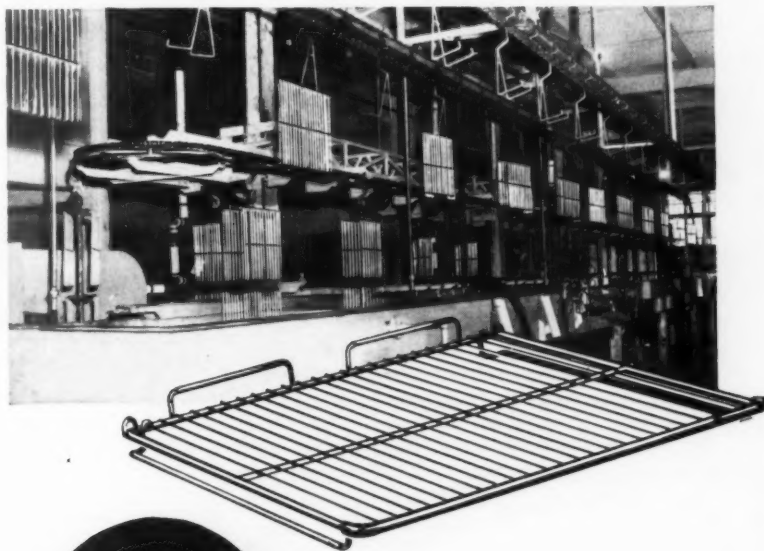
Herman Cook joins Association of American Railroads staff

Herman L. Cook has been appointed to the newly created position of ceramic engineer by the Freight Claim Division, Association of American Railroads, effective November 1.

Cook is a graduate in ceramic engi-

neering (1923) from the University of Illinois, and has had extensive experience in manufacturing all kinds of products finished in porcelain enamel. He is well known throughout the major appliance and metal products fields.

He will serve both manufacturers and railroads in determining causes and prevention of damage to porcelain enamel articles and related products.



It's
"YOUR PRODUCTION LINE"
.....at USP!

You can make this famous USP production line your own—for the production of standard or specification shelving and shapes that will increase sales and profits for you.

Whatever your shelving requirements—in shape, size, quantity or finish, you are assured that USP's 40 years of specialized engineering and production experience will deliver you the best that modern machinery and technique can make. For you know USP'S reputation for rigid inspection and complete satisfaction on delivery.

Your shelving is the selling space of your product. To make sure its design, finish and utility are *right*, your best policy is to see Union Steel Products Company first, and always.

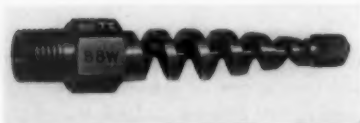
UNION STEEL PRODUCTS COMPANY

Wire Products Division: ALBION, MICHIGAN



New Supplies and Equipment

K-31. Spray nozzle with spiral design for finer atomization



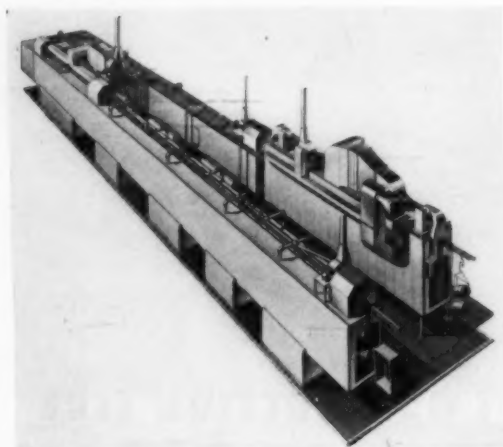
A new spray nozzle which operates on a radically different principle has been announced by Bete Fog Nozzle Co. The new line of spray nozzles has a unique spiral design that produces a finer atomization.

More Information

For more information on new supplies, equipment and literature reviewed here, fill out the order form on this page.

The new type nozzle is now being produced in various spray patterns and with flow rates from one-quarter gallons per minute to 100 gpm. The nozzles can be used for all kinds of spray problems where a fine break-up at low pressures is required.

K-32. Continuous machine reduces pickling time to less than one-third



A new and completely enclosed washing and pickling machine which is said to reduce pickling time to less

than one-third has been announced by The R. C. Mahon Company. The new machine, with continuous proc-

essing, has positive protection for the continuous overhead monorail conveyor.

The manufacturer states that their new pickling machines can be designed to meet any requirement of product processing, production rate, or plant layout.

K-33. Blind fastener for attaching small parts to metal panels

A new blind fastener, known as the bolt-retaining "speed clip" for attaching small parts and accessories to metal panels, has been announced by Tinnerman Products, Inc.

Designed originally for the attachment of refrigerator shelf supports, the new "speed clip" is applicable for many other blind assembly operation where tapped accessories — such as handles, knobs, plates, medallions, brackets and ornaments — are attached to metal panels.

NEW LITERATURE

110. Resistance welding booklet

A new 32-page booklet explaining and illustrating advanced techniques in the resistance welding processes has been announced by The Resistance Welding Institute.

"Design for Resistance Welding" covers the theory and application of spot, seam, projection and butt welding. There are 61 drawings and photos and 11 tables for the guidance of resistance welding users.

111. Data book on bearings

An entirely new 112-page detailed catalog and engineering data book covering the company's complete line of ball and roller bearings has been announced by Link-Belt Company.

112. Primer for sign buyers

"A Primer for Sign Buyers" is a new 8-page illustrated booklet designed by the Porcelain Enamel Institute to provide the sign buyer with helpful information covering the important considerations of design location, manufacture, and lighting of outdoor signs.

FINISH
360 N. Michigan Ave.
Chicago 1, Illinois

Please forward to me at once information on the new supplies and equipment and new industrial literature as enumerated below:

No. _____ No. _____ No. _____ No. _____

No. _____ No. _____ No. _____ No. _____

Name _____ Title _____

Company _____

Company Address _____

City _____ Zone _____ State _____



**Some things
just can't
be neglected!**

**.... BE SURE YOU'RE BUYING
THE BEST FRITS ...**

**CHECK THIS LIST AND YOU'LL
KNOW WHY HOMMEL FRITS ARE
YOUR CHOICE FOR THE BEST—**

- Lower production costs
- Sales appeal finish
- Uninterrupted production
- Superior research facilities to maintain high quality standard
- Constant customer satisfaction
- Specialized experience to meet your exact needs
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- Prompt shipments

Many decisions can be delayed, set aside, put off, or even forgotten without serious repercussions . . . but . . . other things just can't be neglected—buying the best frits, Hommel Frits, is one of them! It's your key to bigger profits.

It is a simple matter to be certain you're buying the best frits.

Write, wire—phone for a Hommel Service Engineer today.

Laboratory Controlled Production of Ceramic Supplies



- FRIT for Steel, Cast Iron or Pottery
- CERAMIC COLORS
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- BRONZE POWDERS
- METAL POWDERS
- SUPPLIES
- EQUIPMENT

Our Technical Staff and Samples are available to you without obligation. Let us help you with your problems.

World's Most Complete Ceramic Supplier

American Gas Association holds thirty-first annual meeting

(Continued from Page 43)

chairman, Gas Air Conditioning Group; H. C. Day, American Radiator & Standard Sanitary Corp., Pittsburgh, Pa., chairman, Gas Boiler Group; J. V. Rerucha, vice pres. & gen mgr., The Columbia Burner Co., Toledo, Ohio, chairman, Gas Conversion Burner Group; Russell M. Cook,

vice pres., Thatcher Furnace Co., Garwood, N.J., chairman, Gas Furnace Group.

L. A. Brand, vice pres., Empire Stove Co., Belleville, Ill., chairman, Gas Floor Furnace Group; J. W. Hebert, pres. & gen. mgr., Calcinator Division, Valley Welding & Boiler Co.,

Bay City, Michigan, chairman, Gas Incinerator Division; Floyd Gaunt, secy-tres., Reynolds Gas Regulator



Stanley Hobson, GAMA president

Co., Anderson, Ind., chairman, Gas Meter & Regulator Division.

Louis Ruthenburg, chairman of Board, Servel, Inc., Evansville, Ind., chairman, Gas Refrigerator Division; Philip S. Harper, president Harper-Wyman Co., Chicago, Ill., chairman, Gas Valve Division; Leland M. Feigel, Servel, Inc., Evansville, Ind., chairman, Gas Water Heater Division; E. J. Horton, asst. to president, Robertshaw-Fulton Controls Co., Youngwood, Pa., chairman, Hotel, Restaurant & Commercial Gas Equipment Division; Alvin M. Stock, The Partlow Corp., New York, N.Y., chairman, Industrial Gas Equipment Division.

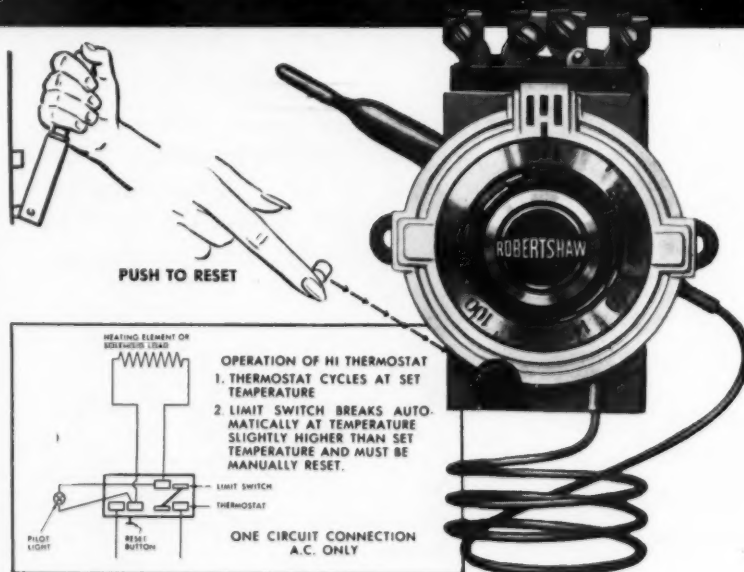
Gas sales gain in August

Total sales of gas by utilities to ultimate customers in August were 2,133,801,000 therms, an increase of 2.3 per cent over 2,086,757,000 therms sold in August, 1948, according to an American Gas Association report.

For the twelve months ended August 31, 1949, total sales of gas amounted to 34,382,884,000 therms, an increase of 9.9 per cent compared with 31,293,795,000 therms sold in the comparable period a year earlier. The Association's index of gas sales for August 31, 1949, was 208.1 per cent of the 1935-1939 average.

Robertshaw

COMBINATION THERMOSTAT AND OVER TEMPERATURE CUT-OUT



Combines temperature control with single pole switch. Current is automatically cut off and switch is locked in open position if temperature at any dial setting, through any cause, exceeds temperature range of control by 7% in liquids or 12% in air. Switch remains open until closed by manual reset button. Design permits mounting control in any one of four positions. Standard size bulbs and capillary tube lengths give great flexibility to meet required heat ranges and installation needs.

Visit Booth D, American Gas Association Combined
Gas Exhibit at the National Hotel Show



Robertshaw

THERMOSTAT DIVISION
ROBERTSHAW-FULTON CONTROLS COMPANY

YOUNGWOOD, PENNSYLVANIA

Large atmosphere generator

The largest DX atmosphere generating unit ever produced by Surface Combustion Corporation has been delivered to Jones & Laughlin Steel Corporation's strip sheet mill in Pittsburgh, Pa. The new generator is to be used for the clean annealing of steel sheets.

First local chapter of NESA formed in Cleveland

The first local chapter of the National Electric Sign Association has been organized in Cleveland, Ohio. Nine electric sign company members of the Cleveland Electric Sign Association are charter members of the chapter.

Packing for export

→ from Page 24

areas at the rear edges of the panels and noticeable only by careful observance."

These minor damages were primarily due to the use of improvised pads.

Further changes were made from time to time as reports came back from consignees all over the world.

These reports were obtained through the full cooperation of E. N. Jaffre, Noma's export manager, whose personal knowledge of conditions at various destinations proved invaluable in arriving at the final packing design.

An example of successful

export packing

Noma's present method of packing gas and electric ranges is best illustrated by the photographs showing the three stages of packing.

The following is a step by step description of the packing procedure.

The packing box

The box now used is known as a "cleated plywood, closed-type box." The plywood is of 3/12 thickness (3 ply), gum or other hardwood. A special toxic formula is provided in the glue bond used for the plywood panels, serving as a mold inhibitor and assuring good protection for the

box contents. The cleats are of commercial 1" x 3" hardwood lumber. The box is of rigid construction, having all six panels reinforced by horizontal and vertical cleats on the outer sides. The front and rear panels also have vertical braces on the inner side to provide greater assurance against the possibility of the top or bottom being forced inward from pressure which might be exerted against these surfaces. The box is large enough to insure a minimum

interior space of 1½" between the box and the range front and back, and 1" at sides and top of range.

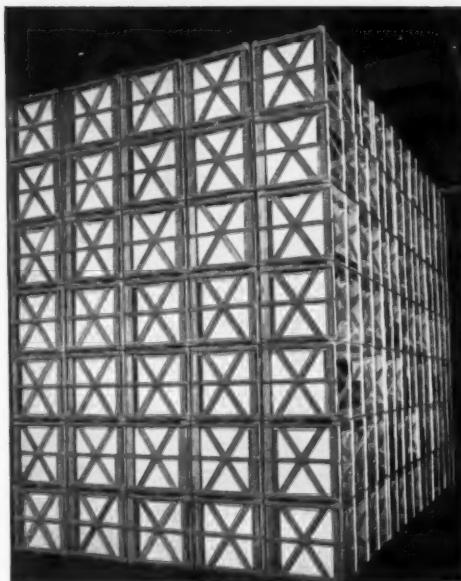
A wooden sub-bottom, of commercial 1" x 4" hardwood lumber, is used to attach the range base to the box bottom. The sub-bottom is bolted directly to the main leg-base of range, by means of four 5/16" x 1¾" bolts which are applied at the start of assembly of the inner main structure of the range. The sub-bottom is later

to Page 62 →

WEYERHAEUSER CRATES

STRENGTH TO SUPPORT LOADS

...NO CRUSHING
OR SAGGING



● Engineered for adequate strength, Weyerhaeuser Crates protect their contents from damage under heavy loads. They withstand sagging and crushing under extreme weights. Thus, your products, enclosed in Weyerhaeuser-designed Crates can be safely stacked. This simplifies handling; cuts storage space costs.

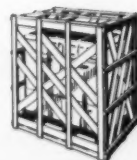
Diagonal bracing, the strongest known, is used for Weyerhaeuser Crates. Corners are nailed to assure strong joints and rigidity. The

open design permits full product visibility for quick inspection. For low cost assembly, the joining frame members of the crates are built of soft hardwoods. These soft hardwoods receive nails without costly pre-drilling and without splitting. Crates are shipped in sections . . . strapped for palletized handling or in bundles for one-man handling.

For complete information, write or phone.

WEYERHAEUSER SALES COMPANY

INDUSTRIAL WOOD PARTS DEPARTMENT
Room 2134 • 400 West Madison, Chicago, Illinois



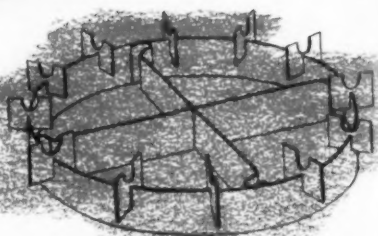
You'll run better Ware . . .



Box Furnace Hanging Rack



Six-Point Coat Hanger



Rolled Alloy Tub-Burning Ring

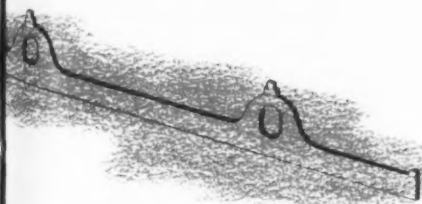


A Dependable Guide to Better Porcelain Enameling

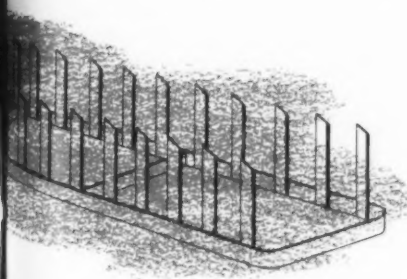
FERRO WILL DESIGN MODERN BURNING TOOLS OF HEAT-RESISTING CAST AND ROLLED ALLOY CONSTRUCTION: COAT HANGERS • TUB-BURNING RINGS • SUSPENSION BARS • HANGING RACKS • HOLLOWARE ASSEMBLIES • UNIT RANGE BODY SUPPORTS

Reduce Operating Costs

with MODERN BURNING TOOLS



Suspension Bar



Rolled Alloy Point Loop Rack

Standardize on firing with tools designed for your specific burning application—with the correct weight ratio—with the proper analysis, and you will immediately increase your production of higher quality ware. At the same time, cost of finishing will be reduced because failures due to spalling are held to an absolute minimum when burning tools are designed with an analysis that resists oxidation at *peak* operating temperatures.

Ferro, with 25 years' experience in designing long-lasting tools for high-temperature finishing operations, will be glad to survey your burning tool setup and make recommendations of a practical nature, that will increase your production of better finished ware. Savings in loading and unloading your line—in labor costs—increased life of alloy and reduced fuel consumption are a few of the other dividends a burning tool checkup can provide. Write us for further information about this Ferro service or request a Ferro representative to call the next time he is in your territory.

Remember! Modern FERRO Burning Tools Will Provide These Advantages:

1. Increase Life of Alloy
2. Reduce Labor Costs
3. Reduce Ware Damage
4. Reduce Fuel Consumption
5. Speed-up Loading and Unloading Your Line
6. Result in Better Finished Ware at the Lowest Possible Firing Cost

FERRO ENAMEL CORPORATION

4150 East 56th Street • Cleveland 5, Ohio

FERRO

→ from Page 59

strapped to the main bottom of the packing box by means of two steel bands, $\frac{3}{4}$ " wide and .020" thick. (With the sub-bottom thus strapped to the main bottom of the box, the main top of the range cannot be subjected to undue pressure should the range be turned upside down during shipment or handling.) Soft rubber pads, $\frac{3}{8}$ " in thickness and $1\frac{1}{8}$ " in outside diameter, are placed between the sub-bottom of the base

legs to serve as cushions to help absorb shocks.

The ranges for shipment overseas are assembled in the same manner as for domestic shipments except that the handles from the doors, drawers, gas cocks and electric switches are shipped detached for safer carriage for those parts to which the handles are normally attached, as well as insuring against damage to the handles themselves. Removing the handles also permits the use of a smaller box

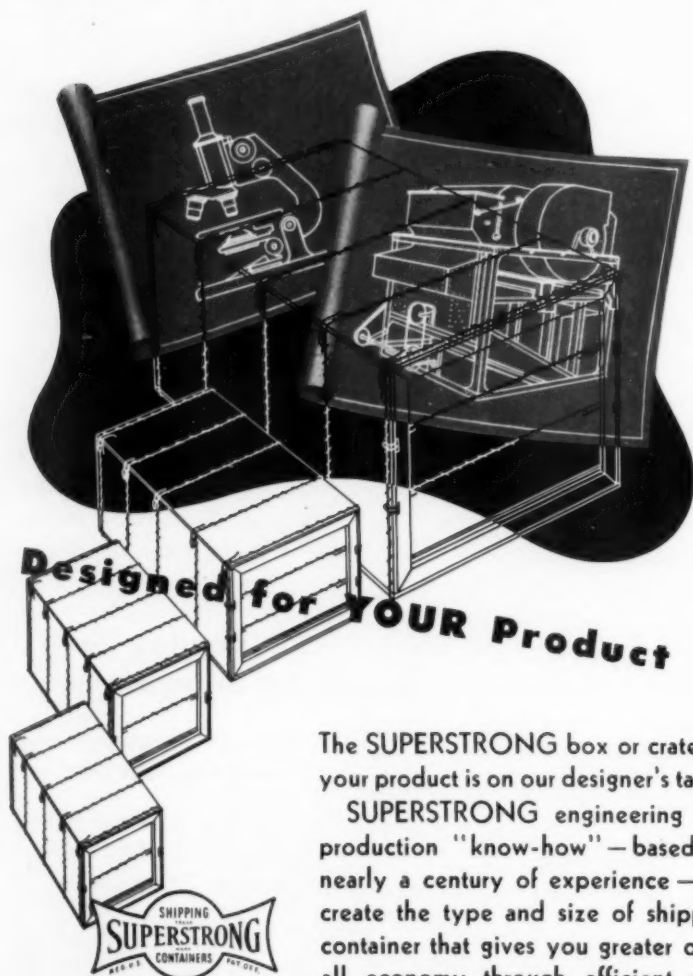
than would be necessary if the handles were attached to the range.

Packing the range

In the packing of electric ranges, the cooking top units are removed from the range top. Each unit is carefully wrapped in kraft paper, then packed in a heavy corrugated

Editor's Note:

It is interesting to note that those companies and organizations who are "out ahead" in protecting their valuable appliances "from assembly line to point of use" are employing the tests outlined by the National Safe Transit Committee. Any company that does not take advantage of this voluntary program for the reduction of shipping losses is depriving itself of the finest available product insurance policy. The author's company is a marine underwriting firm.



The SUPERSTRONG box or crate for your product is on our designer's table.

SUPERSTRONG engineering and production "know-how" — based on nearly a century of experience — can create the type and size of shipping container that gives you greater overall economy through efficient construction, reduced space requirements, less shipping damage.

No obligation — just an opportunity to let us give you all details.

WIREBOUND BOXES and CRATES
WOODEN BOXES and CRATES
CORRUGATED FIBRE BOXES
BEVERAGE CASES
STARCH TRAYS
PALLETS

RATHBORNE, HAIR AND RIDGWAY COMPANY
1440 WEST 21st PLACE • CHICAGO 8, ILLINOIS

carton. All door, drawer, and switch handles are also carefully wrapped in paper and included in the carton with the top units. This carton is then placed inside the oven compartment between the two oven racks which themselves are in a protective coating of heavy kraft paper, placed on the upper and lower rack support ledges in the oven.

The deepwell cooker is also removed from the cooking top, returned to the same carton in which it was originally packed, and placed inside the broiler or warming compartment of the range.

In the packing of gas ranges, the cooking top burners, top grates, top burner wells, and top burner lighter tubes are individually wrapped and packed in a heavy corrugated carton. This carton is placed inside the oven compartment in the same manner as in the electric range. The broiler pan and cover are wrapped in heavy kraft paper and placed in position in the broiler compartment.

After the detachable parts have been packed inside the range as described, the doors and drawers are sealed with kimpac of 3" width and .27" thickness, placed between the panel linings and main front of range, and also between the flanges of adjacent panels to prevent the panels from coming in direct contact with

each other. The doors and drawers are held in closed position by means of heavy paper adhesive tape, 1" in width and with a tensile strength of 320 pounds per inch of width. This tape extends across the front of range and around the rear of the body side panels.

Spacers between range body and upper sections of box

Built-up pads of corrugated paper are placed at the four corners of the range body, and also at the ends of the main top, to serve as spacers to hold the range body in proper relation to the inner surfaces and corners of the packing box. (A layer of corrugated paper is placed directly over the range top to serve as a base for the top corner pads, to prevent marring or scuffing of the top surface due to friction.)

In packing ranges equipped with a cooking top lamp, the package containing the lamp is placed above the main bottom of the box, underneath the range base, and attached to the bottom by means of $\frac{3}{8}$ " wide steel strap.

Assembly of the packing box

The box top is placed in position above the corrugated spacer pads, and the two end panels of the box are nailed to the top and bottom of the box. The front and rear panels of the box are then nailed to the assembled section of the box. Cement-coated, eight-penny nails are used for all sections of the box at 6" intervals.

Steel straps, of $\frac{3}{4}$ " width, are then applied vertically around the ends of the box and stapled to the cleats.

The packed range is then delivered to the shipping department, where the proper markings, consignee's name and address, and other necessary information is stencilled on the box exterior.

Methods currently employed for the inner packing and boxing of gas and electric ranges for export shipment were adopted after exhaustive tests of points of vulnerability. *Packing procedures were originally developed through vibrator, incline impact, and drop tests to simulate as closely as possible the actual abuse to which appliances would be subjected in over-*

seas shipments. The condition of ranges as received at overseas destinations has also been consistently checked.

Laboratory tests are, of course, essential in developing any packing and we wholeheartedly endorse the efforts of *finish* and the National Safe Transit Committee in establishing testing standards for the appliance industry.

The final method of testing the adequacy of any packing should be the

detailed out-turn reports. Every manufacturer, who is interested in delivering his carefully engineered product in a salable condition, should enlist the aid of his distributors, dealers and sales representatives in obtaining such out-turn reports. The same sources could supply him with information regarding any local conditions which would affect the handling of his product at the various destinations.

THE R-S TWO-WAY RIDE RECORDER



Weight: 17½ pounds
Case Dimensions: 8" x 15" x 8"

**An Important Unit in the "Safe Transit" Program
Used in the Laboratory and in the Field**

THE R-S Two-Way Ride Recorder meets all of the specifications adopted by the Porcelain Enamel Institute in their standard test procedure. Same sturdy design that has been used so successfully during the past twenty-eight years by both railroads and shippers. A simple and reliable instrument.

The amount of savings realized by many manufacturers who have used this recorder in accordance with the PEI testing procedure are enormous. One manufacturer has reduced losses from 28% to less than 1% because of the adoption of this "pre-transportation" testing. Another manufacturer making 80,000 units per year reports a saving of over \$1 per unit because of saving in more effective, but cheaper and simpler, design of merchandise and crating.

Participate in the "Safe Transit" program as many others are doing. Write for more information on how YOU can save money and protect your products in transit.

"Now available with 16 day clock movement"

THE IMPACT REGISTER CO.

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Seven Reasons for P. E. I. Membership

1. **MARKET DEVELOPMENT** — individual counsel and guidance. Industry publicity and advertising.
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6. **SALES MANAGEMENT CONFERENCE** — annual clearing house for advanced selling and promotion techniques.
7. **NATIONAL SAFE TRANSIT COMMITTEE** — a national cooperative program for the reduction of packaging and shipping losses.

If you operate a porcelain enameling plant

in any country

you should belong to the P. E. I.

Operators of porcelain enameling plants in any country can benefit from membership to an extent far beyond the modest membership fee.

Plant operators in the U.S.A. who have enameling facilities should consider P.E.I. membership a must — for the benefits it offers to management, sales and advertising departments, and plant operating men. Facts on enamel processing, market information and selling methods are yours, as a member.

It will pay you to "join up." Apply now for membership.



Eleventh annual forum for plant men

→ from Page 31

General Motors Corporation, presided over the next morning session, which included the following papers: "The Evolution of Deep Drawing Lubricants for the Porcelain Enameling Industry" by G. A. Cairns, Macco Products Company; "Emulsion and Alkaline Cleaners" by A. J. Hollo-way, Geo. D. Roper Corporation; "Maintenance and Operation of Spray Pickle Equipment" by H. C. Ellinger, Philco Corporation; "Low Pressure Air Atomization for Spray Guns" by M. L. Pouilly, The DeVilbiss Company; and "Automatic Spraying of Porcelain Enamel" by D. J. Pollingue, Jr. and John B. Verneti, Lustron Corporation. Mr. Pollingue presented the paper.

The next session had as its presiding officer Edward Mackasek, managing director of the Porcelain Enamel Institute. Papers presented were "Effects of Mill Additions on Properties of Titania-Opacified Cover Coat Enamels" by Dr. E. E. Marbaker, senior fellow, Mellon Institute of Industrial Research for The O. Hommel Company; "Discussion of Control Methods, What Equipment is Being Used, and How Tests are Being Made" by George D. Martin, Pemco Corporation; "Comparison of Porcelain Enamel with Organic Coatings" by Dr. G. H. Spencer-Strong, vice president and director of research, Pemco Corporation; and "Influence of Training on Perception" by Dr. Samuel Renshaw, professor of psychology, Ohio State University.

The final Forum session consisted of answers to formal questions presented to a Board of Experts and a thorough discussion by the Board and from the floor of all subjects submitted. Dr. McIntyre, chairman of the Committee, served as presiding officer of the Board.

Banquet guest speaker discusses public relations

Headline speaker for the annual banquet held at the Deshler-Wallick Hotel was F. F. Gregory, director of public relations, A. O. Smith Corporation. Mr. Gregory's subject was

"How We Can Build Good Public Relations for Our Company and Its Products." Opinions seemed unanimous that Mr. Gregory's message was both inspiring and constructive.

Interesting plant trip

Final feature of the 11th Annual Forum was a scheduled plant tour through the plant of Lustron Corporation, builders of porcelain enamel all-steel homes. The trip included all major sections of the mammoth Lustron installation — fabrication, porcelain enameling, packaging and plant

assembly on especially built truck trailers, and actual construction practice.

Forum proceedings

All papers presented at the Forum, together with the floor discussions will be published in the 11th Annual Forum Proceedings and a copy will be sent to all paid registrants. In addition to serving as valuable reference material, the Forum Proceedings will serve as a reminder of one of the most successful Forums yet held.

A GOOD THING TO REMEMBER ABOUT METAL CLEANING

NO MATTER what soil you must remove — from light, thin films of oil to heavy, burned-on residues of buffing compound — there is an Oakite material designed for that job.

Countless Combinations

The twenty types of metals and alloys in common industrial use . . . the dozen or more major fabricating processes . . . the two dozen finishing processes . . . the countless varieties of dirt that adhere to metals . . . have made metal-cleaning a complicated business.

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But the chemists and engineers of the Oakite Chemical Research Laboratory and the Oakite Technical Service Department — with 40 years of experience in metal-cleaning — are always able to work out a right answer for a new problem. Best of all, they are represented in your neighborhood by a man whose skill and competence can bring the Oakite laboratory into your plant.

Free Oakite Service

For the right answer to that tough metal-cleaning problem, call your Oakite Technical Service Representative today. Let him help you work out a procedure that will produce best results at lowest costs. If you don't have his phone number, write to Oakite Products, Inc., 17 Thames St., New York 6, N. Y.

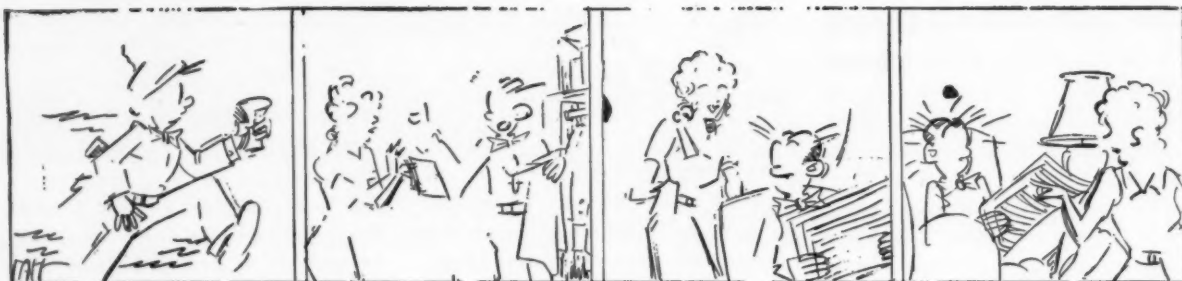


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INDUSTRIAL CLEANING MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. & Canada



This is how Chic Young, the cartoonist, makes a first rough sketch for the famous strip.



Then when each panel in a strip meets his approval, he makes a careful pencil rendering as above.



After this, the pencil rendering is carefully inked in, as you see here.

STEP BY STEP...

that's the way it's done successfully!

AS YOU CAN SEE, Chic Young, who draws the popular "Blondie" comic strip, goes through many steps to arrive at a finished cartoon.

And, cartoonist Chic Young, together with millions of other smart Americans, will tell you that the step-by-step method is the easiest, surest way of doing anything worth while.

Particularly, saving money.

One of the easiest and surest ways to

set aside any worth while amount of money is to buy United States Savings Bonds the step-by-step method—

So set aside a *regular* amount week after week, month after month, year after year. Then in 10 short years you will have a mighty nice nest egg tucked away for you and your family.

Get started now. Get your Bonds through Payroll Savings or at your bank or post office.

AUTOMATIC SAVING IS SURE SAVING—U. S. SAVINGS BONDS



Contributed by this magazine in co-operation with the Magazine Publishers of America as a public service.

A review of de-enameling practice

(Continued from Page 34)

use of molten caustic de-enameling is fairly expensive, due to the fact that most operators use electrical energy for a source of heat. Finally, the high temperatures involved may warp light-gage or loosely fabricated parts. It does have the advantage, however, of being very rapid as compared to other methods.

Boiling caustic solution

The second chemical method in general use, and the process which is used by a majority of enamellers, calls for the use of a boiling caustic soda solution made up to a strength of 5 to 15 pounds of caustic per gallon of water. One modification of this particular process is covered by U. S. patent No. 1,923,828 issued August 22, 1933. In using the solution method, the ware is immersed in a boiling solution of caustic alkali, usually caustic soda, in most cases a strength of 15 or 16 pounds of caustic per gallon of water being used. This solution is kept boiling and the ware is agitated mechanically in order to prevent the sludge from accumulating on the surface of the ware and slowing down the process. In most plants 10 to 12 hours are required to de-enamel the ware satisfactorily. Some plants have used variations of this system, employing much weaker caustic solutions.

Thus, for example, one operator has used a caustic solution of 5 to 8 pounds of caustic per gallon of water. This particular operator has also incorporated some rather unusual factors in his set-up. Instead of placing the basket carrying his ware on the floor of the tank, he elevates it about six inches off the bottom by means of two steel beams, thereby allowing the sludge to settle on the bottom of the tank and eliminating the requirement of agitation which has been the source of a great deal of difficulty, both in regard to maintenance and the damaging of ware during the de-enameling process. The tanks are heated by steam carried at 60 pounds pressure and sent through coils located along both sides of the tank. This set-up re-

moves the enamel in about 10 hours of operating time, following which the ware is washed lightly with a hose and is water cleaned with a spray gun with a 90-pound air pressure. In a few cases wire brushing is necessary. The sludge basin on the bottom of the tank requires cleaning approximately once every two weeks. In order to maintain the efficiency of the operation, this enameler has two sets of heating coils, one set of coils being removed when the tank is shut down for cleaning and placed in a pickle tank of cold muriatic acid in order to remove the scale buildup. It is estimated that the cost of this particular operation runs about 5½¢ per square foot of ware cleaned, about half the expense going into material and the other half into labor. This particular set-up appears to have a number of advantages in that it is somewhat safer than the normal caustic solution process, does not appear to be quite so messy in view of the fact that the tanks are not agitated, and, finally, has eliminated damage to ware and abrasion to equipment due to the agitation process.

In view of the apparent difference in opinion between operators using comparatively high caustic soda solutions and those using comparatively low-strength solutions, a few experiments were carried out in the laboratory in order to determine roughly the effect of various factors on the process. In the course of this experiment a number of different enamels applied at different thicknesses, including an antimony opacified super-opaque enamel applied at 50 and 80 grams per square foot, a zirconium opacified super-opaque enamel applied at 50 and 80 grams per square foot, and an antimony opacified acid-resistant enamel applied at 15 and 25 grams per square foot over a 30-gram fired coat of super-opaque antimony opacified enamel, were subjected to caustic solutions containing 5, 10, and 15 pounds of caustic soda per gallon. The time required to remove the enamels with the various solutions carried at boiling was determined.

Results of the tests indicated that the behavior of the three types of enamels tested is entirely different. In general, the acid-resistant enamel was more difficult to remove, gram for gram of coating thickness, than the zirconium opacified enamel and the ground coats. The effect of increased application weight was very pronounced, especially in the case of the more difficulty attacked enamels. Thus, for example, with the antimony opacified enamel an increase of 30 grams per square foot in application doubled the de-enameling time. In general, the de-enameling time required with 5 pounds of molten caustic per gallon of water ranged from 4 hours with ground coats and 6 hours for 50-gram coats of zirconium opacified enamel to 12 hours for the 80-gram coat of antimony opacified enamel and the heavier coating of acid-resistant enamel. When the concentration of caustic was raised to 10 pounds per gallon of water, there was a marked decrease in the de-enameling time for all coatings. Thus, it became possible to remove the ground-coat in approximately ¾ of an hour and even the coatings which had required 12 hours in the 5-pound per gallon solution were now removed in approximately 2 hours or slightly less. A further increase in the concentration to 15 pounds of caustic per gallon of water appeared to have again increased the de-enameling time for all the enamels with the exception of the ground coat and the zirconium opacified enamels which were removed in ½ hour.

These rather crude tests indicate not only the effect of enamel composition and application weight upon the problem of de-enameling but also appear to show that there is an optimum or maximum alkali concentration for maximum efficiency. It would appear that this concentration lies in the neighborhood of 10 pounds of caustic per gallon.

The use of caustic alkali either as molten caustic or as a solution for de-enameling has, aside from the general unpleasant and hazardous aspects of operation, two major drawbacks, one of which is encountered only in plants with a nickel pickle or nickel flash

set-up. In these plants special care is required in handling the de-enameled sheets because the very fine nickel deposits will separate from the ware during the re-pickling operation and will carry through into the ground coat, causing defects. As a result it is necessary that such operators take steps to eliminate the nickel flash prior to the re-pickling operation. For this purpose some operators use nitric acid; others use a light

Whether this is true or not, and according to operators it appears to be somewhat doubtful, the acids do attack the steel, especially in the areas which are covered only by ground coat, thereby reducing its gage in such areas.

De-enameling with anhydrous hydrogen fluoride

While discussing chemical de-enameling, it may be desirable to men-

moval of porcelain enamel from metal, the use of the sand blast for de-enameling cast iron pieces is well-known and widely used. In Europe, it has been customary in many plants to smash enameled articles mechanically in such a way that the enamel is broken off so that the enameler can salvage the metal and even the enamel if desired. In several plants in the United States, the sand blast has been used on sheet iron, especially where very heavy gages are concerned, but so far as I have been able to ascertain, there is only one plant which has successfully employed sand blasting methods to de-enamel all their scrap ware. The sand blast has many obvious advantages. In the first place the metal is not attacked as is the case when acids are used and to some extent with alkalies, so that there is no blistering and similar defects; neither is there any danger of carry-over of de-enameling solution into the pickle tank and the ground coat. Furthermore, the problems incident to the removal of the nickel flash are eliminated, and, finally, the surface of the metal, properly treated with the sand blast, is conducive to a maximum adherence. As has been set forth, most enamelers have been afraid to work with the sand blast except on very heavy gage metal due to the fear that the metal would warp under the action of the blast. One company, however, has been using this method to de-enamel over the past ten years with great success. They have found that the secret of the operation lies in a close correlation between the air pressure, orifice size, and the gage of metal being enameled. No special equipment is required. Any cabinet type sand blast may be used. Thus, with 16-gage metal which is well-formed (that is, quite stable), it is possible to use a $\frac{3}{8}$ -inch orifice with 100 pounds of air pressure. If the metal gage is decreased or the solidarity of the piece is diminished, the nozzle size is increased and the air pressure decreased. Thus, for example, on a 16-gage piece the nozzle size would be $\frac{3}{8}$ -inch with air pressure of 100. On an 18-gage top, the nozzle size would be $\frac{1}{2}$ -inch and the

Orifice Sizes and Air Pressures Recommended for Sand Blasting

<u>Metal Gauge</u>	<u>Orifice</u>	<u>Air Pressure</u>
16 and heavier	$\frac{3}{8}$ in.	100 lbs.
18	$\frac{1}{2}$ in.	70 to 75 lbs.
20 to 24	$\frac{1}{2}$ in.	55 to 60 lbs.

Note: Tight or rigidly fabricated parts will naturally withstand higher pressures than more flexible shapes.

sand blast and some use both. Even so, the results are not too satisfactory unless great care is taken. The second major drawback is the danger of the caustic from the de-enameling operation being carried over into the pickle tanks and even into the ground coat. The boiling caustic solution method of de-enameling is at best messy and a somewhat hazardous procedure. Few enamelers are willing to admit the de-enameled ware resulting therefrom can be trusted to produce first-quality ware on re-operation.

Acid de-enameling

A third method of chemical de-enameling which was formerly rather widely used but which has been more or less abandoned in recent years is the use of acids for de-enameling. With non-acid-resistant enamels, either cold hydrochloric acid or a hot solution of fairly strong sulfuric acid (say 12%) was used. Where the latter was used, it was customary to place the ware in the tank, heat to 140-150° F., hold at this temperature for one hour, following which the tank and ware were allowed to cool, and de-enameling was completed after 12 hours. Proponents of this operation claim that the procedure eliminates hydrogen blistering due to the absorption of hydrogen in the steel.

tion hydrofluoric acid. This material is the only acid which will effectively and readily dissolve silica, and for this reason experimentors have always felt that it should be a highly desirable agent for de-enameling. The literature shows many experiments and a number of patents dealing with the use of hydrofluoric acid. However, up to the present time, apparently none has been too successful since hydrofluoric acid is an extremely caustic material, being dangerous and hard to control. With the development of anhydrous hydrogen fluoride, the hopes of those interested in the use of hydrofluoric acid for de-enameling have again arisen. Anhydrous hydrogen fluoride is a gas which was used rather widely during the latter war years, and it was felt that this material would be more readily controllable than the liquid hydrofluoric acid. It is possible that, using especially designed equipment properly constructed with special metal alloys, anhydrous hydrogen fluoride could be satisfactorily used. However, the results of experiments to date indicate that it may be very dangerous unless handled by experts with proper equipment utilizing remote control.

Sand blasting

In regard to the mechanical re-

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air pressure from 70 to 75 pounds. With a 20-gage oven door, the nozzle size might be $\frac{1}{2}$ inch with a 55- to 60-pound air pressure. With a 20-gage body size which is less securely formed than the door panel, the same $\frac{1}{2}$ -inch nozzle size can be used with a 45-pound air pressure. By further decreasing the air pressure and increasing the orifice size, it has been possible to blast ware down to 22 gage. This enameler recommends the use of Ottawa flint sand. The blast is directed at the face of the ware at an angle of 15 to 20° from the horizontal. If the angle is increased, the sand impinges on the ware more directly and, instead of lifting the enamel from the steel, actually knocks it off, distorting the metal. Distortion is further minimized by working across the piece from front to back so that there is always a coating of enamel ahead of the sand stream. This method of procedure has been used over a period of years and has been found to be extremely successful. It is rapid, clean, and it is claimed to be no more expensive than the chemical methods, possessing all their good features and none of their drawbacks.

Conclusion

In view of this discussion, it should now be possible to answer the two questions which were posed at the outset of the discussion: first, is de-enameling worthwhile, and, second, what are the most satisfactory methods? In regard to the first question, there is no doubt but that de-enameling is worth-while in the case of complicated and expensive pieces, as well as in the case of special parts. The desirability of de-enameling all types of ware, however, is open to some question, in view of the fact that experience shows a tendency to de-enamel the same part time and again and also that it gives rise to a psychological handicap whereby plant personnel become more careless than should be the case because of the knowledge that their mistakes can be salvaged. Finally, where chemical de-enameling is the practice, it is indicated that the ware produced after de-enameling is decidedly inferior to the original product so that, where

high-quality enameling is the rule, de-enamelled ware will have difficulty in meeting inspection standards.

In regard to the best methods for de-enameling, it would appear that, all things considered, the sand blasting operation shows far more promise than any of the chemical methods. This is especially true in view of the fact that the de-enamelled ware resulting from properly controlled sand blast operations suffers from none of the defects introduced by the chemical processes and, therefore, should be first-quality ware. Aside from the equipment required, the chief handicap in this method would be proper-

ly controlled supervision of the processes in order to avoid warped pieces. Insofar as the chemical methods are concerned, the molten caustic method is far more rapid than the boiling caustic solution but is probably more expensive and more hazardous. Both methods present numerous disadvantages. The use of acids is no longer practical in view of the general use of acid-resistant enamels, as well as the effect of the process on the ware.

This article was adapted for finish from a paper presented before the Eighth Annual Forum of the Porcelain Enamel Institute, with tables from a paper before the American Ceramic Society.

Operation and maintenance of spray pickling equipment

(Continued from Page 28)

heating coils and spray pipes after approximately 1 year's use. Of course, there is the normal maintenance and replacement of steam pipes, valves, etc., as well as maintenance of the automatic control equipment.

The cleaning operation consists of dumping the cleaners, neutralizer, and water rinse tanks after 80 hours of operation. The tanks are completely washed out at this time. The spray nozzles are inspected, and any plugged nozzles are removed and cleaned. As an aid to cleaning these tanks and spray nozzles, a weak inhibited muriatic acid solution is used whenever necessary to dissolve lime and rust deposits. This solution is then dumped and the system well rinsed. The filters for the nickel and neutralized sections are cleaned after 40 hours' operation.

Without any figures for substantiation, we estimate that one man-hour of maintenance labor is required per hour of machine operation. This includes mechanical repairs, cleaning, and servicing.

By following these procedures for operation and maintenance, an uninterrupted flow of superior quality ware is assured.

In conclusion, here are a few things to keep in mind for anyone anticipating the installation of a spray pickling machine:

1. Provide ample clearance for the

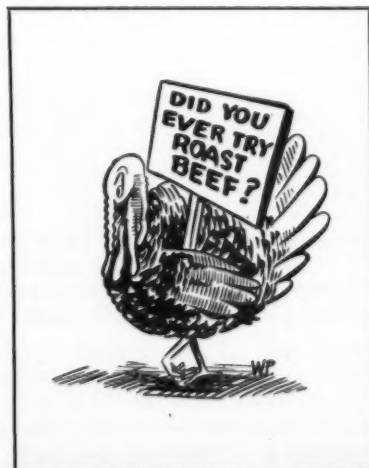
largest part to be processed, so that the ware does not have any chance of jamming in the machine.

2. Be sure the ventilation provided is ample. Spraying hot solutions cause a great amount of water vapor or steam. Improper ventilation will result in fumes in the plant, and excessive corrosion to the machine.

3. Provide for ample and reliable automatic controllers. These controllers insure continuous good operation.

Finally, I wish to state that we believe that spray pickling produces better ware at a lower over-all cost than any other method yet devised.

Adapted for finish from a talk before the Eleventh Annual Forum of the Porcelain Enamel Institute.



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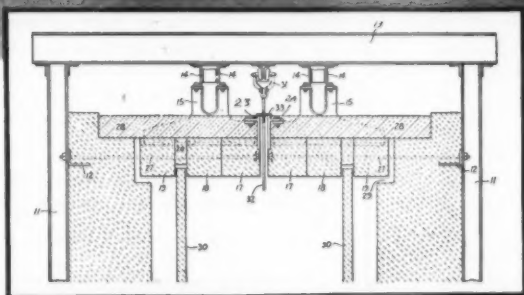
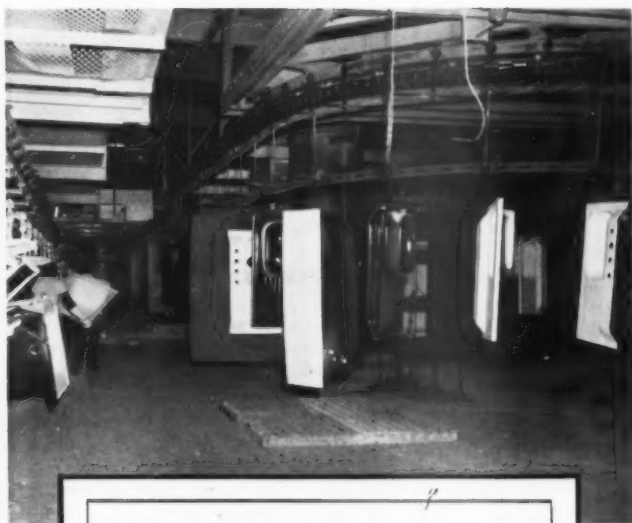


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